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Problems of Economics

Selected Articles from

Soviet Economics Journals in English Translation

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Concerning the Elaboration of a Composite Material Balance

An Attempt to Define the Efficiency of Capital Investments in the Iron and Steel Industry

Concerning Some Factors Determining the Rates and Proportions of Socialist Reproduction

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Principal Forms of Increasing Real Wages in the USSR

Methodological Questions of Revaluing Fixed Capital

Methods of Revaluing the Social Product in Prices Which Approach Values

Technical Progress and the "Managerial Society"

Cadres in Economic Competition: The Lag of the USA is Growing

Some Questions of the Competition Between the USSR and the USA in Agriculture

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PROBLEMS OF ECONOMICS

Selected Articles from
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AN IMPORTANT ANNOUNCEMENT TO SUBSCRIBERS

Beginning with the current issue, PROBLEMS OF ECONOMICS will contain articles selected from the following publications: Problems of Economics; Journal of Statistics; Planned Economy; Socialist Labor; Journal of Leningrad University – Economic Series; Journal of Moscow University – Economic Series; World Economics and International Relations; Foreign Trade, and other important economic journals from the USSR.

The most outstanding articles on economics appearing in the Soviet Union will now be available in English translation on a regular monthly basis. Each article chosen will be translated in full.

An Advisory Committee of specialists in the field of Soviet economics will make recommendations on the choice of articles to be translated and published. To date, this Committee includes the following: Dr. Abram Bergson, Dr. M. Gardner Clark, Dr. Gregory Grossman, Mr. John P. Hardt, Mr. Leon M. Herman, Dr. Holland Hunter, Dr. Lynn Turgeon.

The Publisher believes that PROBLEMS OF ECONOMICS will be a much more valuable journal as a result of this change in policy (i.e., shifting away from the complete translation of one journal – Voprosy Ekonomiki – to the translation of a representative selection of articles from a wide range of Soviet economic journals). The change has been made only after lengthy consultation with many educators, who expressed the unanimous opinion that a journal of selected articles would serve their needs better.

While we are convinced that the resulting journal will be much more valuable, we offer any subscriber the right to cancel his subscription within 30 days after receipt of the November 1959 issue of PROBLEMS OF ECONOMICS if he is dissatisfied with the changeover.

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Strumilin:

he Law of Value and Planning

The idealist philosophers were justifiably reproached
r the fact that they were merely trying to explain the
rld, when it was a question of its radical reorganization.
turally, these accusations do not apply to Soviet econo-
sts, who are among the representatives of the most revo-
ionary theory of our epoch. However, it is regrettable
at even in their midst there are many who in these times
radical changes in all social relations lag behind the pace
these changes. Clinging too long at times to what are ob-
ously antiquated ideas, they are not doing enough to ad-
nce theory, and under these conditions even the most ad-
nced theory begins to lag behind revolutionary practice,
ich is advancing faster. I have in mind, in particular, the
istaken idea that the law of value is incompatible with a
anned economy which was current among us for a long
me with the tenacity of a prejudice, retarding the develop-
ent of the theory of political economy of socialism in the
viet Union to the detriment of practice.

After our economists had succeeded, thanks to their cre-
ive approach, in abandoning antiquated positions on this
estion and finally recognized that the law of value does
erate in the USSR, we were able to see the entire prob-
m of value in an entirely different light. Developing this
w point of departure, it is now necessary to show what the
ncrete manifestations of the law of value can and should
in the socialist economy, what its functions are at the
ven stage of economic development, how they are distin-
ished from previous functions and the future course of the
w of value in the process of development towards com-
unism. And most important, it would be desirable to think
er and discuss, without any unnecessary casuistry and
holasticism, all the practical implications of the recog-
tion that the law of value operates under socialism, for
nproving our planning of prices and for solving other plan-
ng problems.

Let us recall some generally known facts. As Marx said,
e nature of value is not stamped upon its face. But by
eans of economic analysis it has been established that use
lues possess value only insofar as they are products of
man labor. In other words, labor is the "substance of
lue" of all goods. Theoretically, the amount of this value
measured by the amount of the "value-creating substance"
, concretely, by depersonalized average labor time so-
ally necessary for the reproduction of the given product.
practice, however, this direct definition of value by the
easure of labor is not possible in all cases, nor is it so
ssential. The point is that the value of the products of la-
or as a social category acquires its full significance only
the moment of its active manifestation in some acts of
s social recognition, as, for example, in the exchange of
ie product for another, or for such a generally accepted
uivalent of value, as gold and money. But from the mo-
ent when products of labor become commodities, they find
quite sufficient, relative though it may be, measure of
lue in a commodity or money equivalent.

Nevertheless, the practical convenience of this indirect expression of the value of commodities by their exchange ratios on the market, instead of a direct expression of labor expenditures in man-days or man-hours, is coupled with very unfavorable consequences. Abstracted from the labor substance of value, the binding cement of social relations, this practice inevitably throws its mystic veil of purely material commodity-money exchange relations over the social relations between persons in production and distribution hidden behind them, and it thus becomes a source of the very harmful commodity fetishism.

At the different stages of social development the law of value is expressed in different forms. However, apart from these local differences in the forms of its manifestation, the following general conclusion may be drawn about its basic functions. Throughout the existence and development of commodity-money relations in social economy, the law of value in the last analysis has operated, through a multitude of intermediate links, in the direction of raising the productivity of labor, i.e., toward a more economical use of labor, a reduction of the expenditure of the value creating substance, of the social expenditure of labor time per unit of production. This is connected with a tendency of human labor expenditure, or with the principle of "economy of time," which in the words of Marx, "remains the first economic law" under the conditions of socialist production as well. Transcending far beyond the commodity phase of our economic development, this progressive tendency towards the saving of labor-time is the basic driving force of the steady growth of productive forces and of the change of social systems throughout history. From this standpoint, the operation of the law of value at the commodity stage of social economy has to be considered only in connection with this general tendency at the given period in history.

The time-saving principle becomes a law of economic development from the very outset. And that is quite understandable. Innovations which lighten labor, reduce the labor-time per unit of production and thus raise its general productivity, as, for example, the division of labor, new methods of work, a new instrument of labor which promises further success in saving the time of producers, have been spreading and becoming implanted in the economic practice of men. This law of saving does not require any sanctions of external coercion, because it contains its own reward. The manifestation of this law may already be seen in the division of labor in the patriarchal peasant family prior to a class society and even in Robinson Crusoe's economic activity on his solitary island where he had to divide his labor-time between various functions in accordance with his wants. Any existence of commodities, of commodity fetishism, is out of the question here, in a natural economy. Nor is there any room here for the operation of the law of value which is inherent in social relations under commodity production. And yet, in the words of K. Marx, the entirely clear and simple relations between the producer and the products of his labor prevailing here "contain all that is essential to the determination of value." (1) This means

that even in the natural economy, where everything is produced for consumption, it is necessary to take account of the labor time necessary for satisfying various wants. And insofar as this accounting is not connected here with commodity exchange and its mist of commodity fetishism, and is quite understandable to every producer, the most elementary principle of time saving becomes in this case an adequate regulator of the production-labor proportions of the economy in accord with its existing requirements. But the performance of this function of regulating production proportions becomes the most essential function of the law of value in subsequent stages of development. That does not at all mean, however, that the law of value may be equated with the elementary principle of economy of time. They must not be confused if only for the reason that the law of value performs this function through different and far more complex means and ways.

In the capitalist society the law of value regulates production proportions not directly, but indirectly, through exchange proportions. Strictly speaking, the law of value establishes only the following: the fluctuations of market prices in the process of exchange are levelled out at the level of the values of the respective commodities, and this, in principle, brings about equivalence in their exchange. And the realization of this direct requirement of the law of value, i.e., the requirement for the equivalence of the exchanged commodities or, what amounts to the same thing, the proportionality between their prices and values, is left entirely and completely to the elemental play of demand and supply in the market. The scarcity of one or another article, and the consequent excess of the demand for it over its supply, leads to an increase in the price of this article above its value and this increase stimulates the necessary expansion of production of the given article. And conversely: surplus production of any article will be punished by a reduction of its price below value, and this will lead to a reduction of its production to the required level. Consequently, only at the moment when all disproportions in production are done away with will it be possible to establish proportionality between prices and values, with the full equality of demand and supply.

The moments when the law of value brings exchange and production proportions into full keeping with its requirements are most favorable from the viewpoint of the principle of economy of time and labor saving. But these are just moments in the society which has anarchy of production at its very basis and which is therefore constantly reproducing new disproportions. And a new disproportion signifies a new squandering of the productive forces of society. We know that labor time spent on the production of some commodity in excess of the existing social demand for it is wasted. And yet the number and magnitude of these disproportions have increased at different stages of capitalist development.

Only in simple commodity production could the law of value operate in full. Average prices kept pace with the movement of commodity values in full keeping with the law, and conformity with the requirements of equivalent exchange in the absence of systematic exchange disproportions was a general rule and not an exception. At the next stage of commodity production, under pre-monopoly capitalism, the law of value manifested itself in the new, changed form of prices of production and the law of equal rates of profit. The rivalry between manufacturers for the highest share in the division of the total surplus value created by labor equalizes their profit rates through a reallocation of surplus value created in different branches of production and enterprises. But this redistribution under conditions of the steadily growing differentiation of the organic composition of private capital is possible only by means of deviations of prices of production from values, with these deviations being systematic and not random. Naturally, deviations of prices from values and the associated exchange disproportions must inevitably be growing with the increasing range of differences in the organic structure of capital.

Lastly, in the imperialist stage the law of value undergoes further changes in the same direction under the powerful impact of monopolistic organizations. It is with the transformation of prices of production into monopoly prices that their deviations from value become still greater. These deviations enable the monopolists to appropriate, by crushing their competitors, not only average rates of profit but also additional super-profits. Consequently, at this stage of capitalism the law of equal rates of profit suffers increasingly greater damage. But the law of value in its initial form is subject to still greater restriction of operation at this stage. It is hardly possible to speak in earnest of equivalent exchange at the imperialist stage where redistribution through prices is the basic method of competition. Disproportions in exchange become the rule here rather than the exception. And where exchange disproportions are prevalent, they lead inevitably to disproportions in production and here violations of the law of value attain a maximum. Nonetheless, this law is expressed here too in that all "violations" of it are fully explained in the light of the same law of value, just as the law of universal gravitation enables us to trace not only ideal orbits of the movements of celestial bodies, but also all the concrete deviations from these orbits under the influence of external influences. The extremely important question naturally arising in connection with this is: wherein and how is the action of the law of value expressed in the planned economy which has as its task the eradication of all disproportions in production?

***

"In all states of society," wrote Marx, "the labor-time that it costs to produce the means of subsistence must necessarily be an object of interest to mankind, though not of equal interest in different stages of development.(2) And this is understandable, because the saving of human labor, or, what is the same, the saving of social labor-time, is one of the most essential conditions for the self-preservation and progressive development of any viable society.

At the initial stages of this development the relations between the producer and the products of his labor are extremely simple and clear. "And yet," says Marx, "those relations contain all that is essential to the determination of value." (3) "In the final analysis," wrote Marx as far back as 1857-1858, "all economy is reduced to the economy of time ...That is why the economy of time, just as the planned distribution of labor-time among the various branches of production remains the first economic law of collective production. It becomes a law to even a greater degree." (4) Consequently, the law of economy of labor which regulated the proportions of distribution of social labor-time in private capitalist economy through market "definitions of value, remains," according to Marx, "the first and most important law in the planned socialist economy."

Marx returns to the same idea in his outline for Volume III of "Capital." When the capitalist method of production is destroyed, but social production reamins, he wrote, the determination of value remains dominant (vorherrschend) in the sense that the regulation of labor-time and the allocation of social labor among different branches of production, and, ultimately, the accounting embracing all this become more important then ever before. (5)

These statements of Marx are so clear and categorical at there would seem to be not even the slightest doubt on is score. The "determination of value" and the law of onomy of labor-time remain, according to Marx, not only e "first" economic law of the socialist society and con- ue to operate as before; they even become a law to a high- degree than ever. And yet for many years these theses und no due recognition in the USSR among the overwhelm- g majority of Soviet economists. This undoubtedly did uch to hinder the successful development of theoretical ought in the political economy of socialism.

All this is a past stage now. No one disputes any longer e fact that the law of value operates in the planned econ- ay, although here, in new conditions it should act in a new ay, manifesting itself in some new forms. But what its w manifestations are concretely is by no means clear as t and it remains a problem to be further investigated. In e first place it is necessary to investigate and explain the isconception on the basis of which the operation of the law value in a planned economy had been denied persistently r a long time.

This misunderstanding apparently originated from the ct that for a very long time the law of value as the main gulator of production proportions and prices in conditions the prevalence of private ownership of the means of pro- ction had been counterposed to the economic plan. In pitalist society, it was said, this regulator was the spon- neous law of value, while in the USSR this role is per- rmed by the national economic plan. From this it was ncluded that the law of value cannot operate in the condi- ons prevailing in the USSR. But there are no logical rounds for this counterposition and for the corresponding nclusions. It is true that in capitalist society the law of alue determines the corresponding production and labor roportions only indirectly, through the market, while in the SSR it is used by society (indirectly, through the collec- ve-farm market, for example, and mainly directly) on the asis of the national economic plan which is designed pri- arily to reveal and remove all economic disproportions nd thus meet the basic requirement of the law of value in e interest of the maximum economy of social labor time. hus, in the first case, the law of value operates automati- ally, as a spontaneous element, and in the second case, as e very opposite of spontaneity, i.e., it is used by society a planned manner and purposefully. (6) But this only ermits us to counterpose planning in the conscious utiliza- on of the law of value ot the blind spontaneity in its mani- estations at different stages of social development, but ives us no right to counterpose the plan to the law of value s mutually exclusive categories. In other words, it is not e function of the plan to reveal the law of value or to be- ome a substitute for it, but to purposefully ensure its opera- on in the new conditions, in the interest of socialism, and hus to reinforce still more this economic law which is im- ortant to us.

The term "law" is employed among us in reference to idely differing concepts. In particular, the only feature hat the laws of nature, economic laws and criminal laws ave in common, is perhaps the fact that it would be equally seless to dismiss them by saying that we do not know them, ince such a rejection serves no purpose. The inexorable ction of laws does not retreat before ignorance. Most cate- orical and unalterable is the action of the laws of nature, f the law of universal gravitation, for example. They are ternal and unalterable. The most incorrigible thickheads ould easily crash against them. They can neither be vaded, or broken. All the more important is it to know hem. Knowledge of them not only guarantees us against fatal mistakes, but assists us in the active use of the forces of nature for man's good. Most conditional are the legislative acts of government which are so changeable in time and space. Even so imperative a command as "thou shalt not kill" is subject here to essential significant limitations. Murder in self-defense is exempt from punishment, murder by sentence of court is lawful. Incidentally, unlike the inviolable laws of nature, criminal laws serve their function only in the process of their violation and the subsequent punishment.

Economic laws occupy a special position. Like the laws of nature they are not decreed, but man gets to know them through the painstaking study of social relations. But they do not possess the coercive power of the laws of nature. And as a rule we do not find the authority of state coercion behind them. Like all other social laws, they are subject to significant restrictions and modifications in the process of the historical development of the economy. And yet we must recognize that they are fully objective laws, which operate quite apart from our will and which cannot be ignored with impunity. Under capitalism where the law of value operated automatically, let us say, regulating market prices through the mechanism of spontaneous competition, the objective significance of this law was more obvious. In a planned economy, where the action of market spontaneity is extremely limited, it is by no means as obvious. At one time it was the vogue among us to deny the operation of all objective economic laws in our society, where the plan, i.e., the will of the law-giver and conscious management of planned economy, had allegedly become the basic "law." But conscious management of the economy does not in the least exclude the need for reckoning with objective conditions and with the possibilities of rational economic initiative. And woe to the planner who, ignoring all objective laws, such as the law of value, because of his ignorance or whim takes it upon himself to plan in the archaic style of Titych's petty tyrants on the principle: "I do what my left leg wants."

There are no such planners in our midst, of course. But the question that logically arises is: Does not the need for reckoning with the requirements of the law of value impose undue restrictions upon the role of the plan in the Soviet economy and does it not belittle this role? As I see it, there is no such danger, nor can there be such a danger in the Soviet economy. In the first place, it should be remembered that the sphere of action of the plan and the tasks of planning in the USSR are incomparably wider and more varied than the sphere of action of the law of value. Our plans determine production proportions and such important proportions of distribution as the relationships between consumption and accumulation (v:m), or between capital investments and defense outlays, which greatly transcend the limits of the regulating action of the law of value. Moreover, the allocation of the national income also predetermines the main production proportions between the basic subdivisions (means of production and articles of consumption), even if we abstract from the special, third subdivision — "means of destruction" — which occupies such an important place in the era of imperialist wars. At this stage our plans are determined, as we know, not only by economic, but also by numerous political considerations of the moment. And these considerations often demand of us certain sacrifices at the expense of various secondary economic interests for the sake of more important political effects at the given moment. In such cases, the law of value must be subordinated to the general objection of the plan.

The directing power of the plan, given juridical effect in the Fundamental Law of the USSR, is indisputable in our country. As for any requirement of the law of value, it does

not possess such signficance, and it acquires force only to the extent that it has been recognized as rational and fully expedient in the given situation, and is therefore given due consideration by the plan. The requirements of reason, generally speaking, are not essential only for those who have been deprived by nature of this useful equipment. But the rationality of any requirement has to be proved, and it therefore leaves room for argument. It is perfectly clear, therefore, that both our practice and theory make allowances not only for accidental deviations caused by miscalculations, but also for consciously made deviations from the requirements of the law of value in planning, to the extent that these deviations may be rationally substantiated. Nevertheless, such cases should be regarded only as exceptions. As a general rule, however, it is necessary to comply to the greatest possible degree with the requirements of the law of value and to make the widest possible use of it in our economy as one of the most important instruments of planning. In this sense, with the recognition of its absolute rationality and effectiveness, which, unfortunately, have not yet been fully disclosed revealed by theory, it will be possible to recognize the law of value as "prevailing" in its inherent sphere of action. It should like to explain this idea by the following analogy. In order to glide through the air, the pilot must know the laws of resistance of the atmospheric environment and to reckon with them, ably employing in good time all the available control instruments for the rational utilization of these laws. The Soviet economist also is not planning in an airless void. He too, must therefore know and reckon with the laws of his economic environment in order to achieve the planned objectives.

Naturally, even the most rational economic requirements are not achieved automatically in the planned economy, but precisely because of this it is necessary to provide for them in our plans. Economic laws may also be ignored in the USSR. But this would not do any good. Let us recall only the sad experience of Pyatakov, Preobrazhensky and their friends with their ill-fated theory of primitive "socialist" accumulation at the expense of the villages. In particular, ignoring the law of value in the name of this "accumulation," they violated this law by their greedily opened price "scissors" grasping to swallow the peasants' grain, but instead of grain this only led to hoarding in the country. Any businessman in a capitalist country who fails to reckon with the laws of the market may pay for this with bankruptcy. This danger does not of course threaten the USSR. But here too, failure to reckon properly with the law of value may produce a host of disproportions, retard the required rate of growth of the productive forces and thereby expose the country to a possible blow by ever alert aggressors.

In order to properly appreciate the significance of the planned fulfillment of all the requirements of the law of value it is necessary, in the first place, to know concretely the essence of these requirements, and the gravity of the consequences which may follow if there is a deliberate refusal to observe these requirements in our conditions. It would be very shortsighted to reduce the entire substance of the law of value to the requirement for equivalent exchange of the products of labor. This requirement reflects only one of the specific manifestations of the law of value in the market circulation of the products of labor. In a planned economy it is also not difficult to imagine a phase of its development in which it would become completely transformed into a unified, though very complex, natural economy in which all wants will be satisfied without the medium of any exchange. This would also obviate the need for equivalent exchange in accordance with the labor-time embodied in the products in keeping with the law of value. It should, however, be remembered that there is still another, more important, function remaining in the law of value, that accounting of the volume of labor required for the production of goods and services.

We have not yet reached the higher phase of communism and are still in the phase of development where distribution is based on the principle: to each according to the quantity and quality of his labor, or, what is the same, in proportion to the labor-time embodied by each in production, i.e., in proportion to the value created by him. Having in mind these very conditions in which "the share of each individual producer in the means of subsistence is determined by his labor-time," Marx wrote that "labor-time would, in this case, play a dual role. Its socially planned apportionment establishes the proper relationship between the different kinds of work to be done and various wants. On the other hand, it also serves as a measure of the portion of the common labor borne by each individual producer, and consequently, of his share in the part of the total product destined for individual consumption. The social relations of the individual producers, with regard both to their labor and to its products, are in this case perfectly clear, both with regard to production and to distribution." (7)

This remarkably clear-cut formulation by Marx leaves no doubt whatever that it anticipates the conditions of economic planning in our time in which there is no place for the commodity fetishism of the capitalist system and where the measure of consumption of each producer is the measure of his specific share in collective labor. It is highly significant therefore that the labor time embodied in products plays a dual role under these conditions: it determines the proper proportions of labor in production required for satisfying various social wants, and in distribution it serves as a measure of the share of consumption of each individual in accord with the value created by him.

Generally speaking, the law of value manifests itself in a great variety of forms in different conditions. In the planned economy they have not been adequately studied as yet. Therefore, presenting below my own ideas on this subject, I should like to raise a number of questions for discussion rather than propose ready-made solutions. Among these questions I include not only an analysis of the requirements of the law of value and the consequences of its violation as regards production proportions and the process of price formation, but also some of its specific manifestations in the sphere of payment and incentives for labor in connection with technical progress, and also in connection with the tasks of accumulation, taxation and rent formation.

***

According to a current opinion, in order to recognize that the law of value operates, it is sufficient that the principle of equivalence in exchange be assured, even if this only applies to the sum total of all commodity transactions in the national economy. Given only accidental deviations of prices from values, which could be ignored in average totals for the national economy as a whole, the equality of the sum of prices to the sum of values for all sale-and-purchase transactions would really be highly significant if it could be detected. However, it is hardly adequate to adopt this criterion of equivalence under conditions of systematic exchange disproportions. It is unclear, in the first place, how the required equality could be expressed: in labor or money terms. It is hardly possible in practice to calculate the whole mass of labor embodied in the goods sold and in the amount of money or gold paid for them. Yet the money value of the goods sold and of the gold paid for them will

ways be expressed by one and the same sum, without oving anything at all thereby.

Here is another possible line of reasoning. Abstracting om the monetary means of circulation, we could say that a commodity economy each commodity is in the final alysis exchanged for a commodity, and even if exchange each of these bilateral transactions of sale and purchase es not correspond individually to the requirement of uivalence, in each case one of the parties loses exactly much as the other gains, and the general result is that far as all the parties are concerned the whole mass of mmodities is realized a priori without any losses and ins in value, i.e., in keeping with the principle of equivace. There is only one essential defect in this a priori asoning. Defining separately the total sales and purases, we calculate every purchase-and-sale transaction ice, because each party to the exchange transaction was uying" someone else's goods, and at the same time "sell-g" his own. Every commodity sold by one of the parties a loss and by the other at a profit, therefore, figures ice: both in the debit and credit side of the given account. this connection the debit and credit totals therefore re-ct the full value of the commodities sold. These results e, of course, equal, because each magnitude is equal to self. But no conclusions whatever can be drawn from this. However, even if it had been proved with greater conusiveness that, even given exchange disproportions, the m of prices in transactions could not in the grand total ffer substantially from the total value of the goods sold, e question of the operation of the law of value in such ses would still require investigation. For, after all, the istence of exchange disproportions in the capitalist econny is inseparably connected with the existence of disprortions in production. And given the existence of the latr, only a part of the created commodities is sold, which eans that society is not using the whole of the labor exnded in production and therefore a certain share of it, in cordance with the law of value, is being wasted. This is here the crux of the matter lies as regards the operation the law of value.

Let me explain this by an analogy from the field of law. e know that along with prescribing various binding standrds, the code of laws invariably provides for a correonding scale of sanctions, or penalties for the violation of e established standards, i.e., penalties commensurate ith the degree of these offenses. In essence, these sancons represent a most important part of the law designed ensure its operation. So long as no branches of the law re committed and therefore no sanctions are required, its otential is not manifested in any way. Only when a breach the law is committed does the law throw the full weight its sanctions upon the heads of the offenders, thus realing its full power and the scope of its action. A law ithout sanctions is like a bell without a tongue or a weapon ithout a charge, and it is unable to fulfill its function. And is applies not only to man-made laws.

Economic laws also possess the power of sanctions, although these economic sanctions are not recorded in any ode. There is, however, a very essential difference beween economic and legal sanctions. While legal sanctions an be enforced only through the medium of a complex pparatus of justice, courts, etc., economic sanctions come nto effect of themselves without any intervention on the art of some apparatus of coercion, and stem directly from n offense against the law. In other words, economic laws venge their offenders automatically.

What precisely are the consequences of disproportions hich perform the role of punitive sanctions for violation of the law of value?

It has already been noted that strict observance of the law of value, complete elimination of production and exchange disproportions in a commodity economy ensure the most rational use of existing productive forces with the most balanced satisfaction of all existing wants of society. And for this very reason the appearance of any disproportion should be regarded as a departure from this optimum which involves direct damage to production and to consumption. Under capitalism, this damage grows into a tragedy of waste with the growth of disproportions. The very law of equal rates of profit and the resulting prices of production inherent in the manifestation of the "transformed" law of value under capitalism, contains in itself a serious threat to the rates of social development. The point is that deviations of prices of production from values follow a definite tendency, which is always in favor of the most technically advanced enterprises and the capitals of highest structure, because prices of production "award a premium" over and above value to these very enterprises and capitals. This multiplies capitals, but it hinders technical progress and retards the rate of development in the most advanced branches of labor, because if their prices of production were reduced to the level of their values, these products would undoubtedly be in much higher demand. Monopoly prices and imperialist profits, operating even more in the same direction, lead ever more frequently to greater stagnation of technique and to increasing decay. And so, the prospect of decay instead of progress is another punitive sanction of the law of value on the capitalist world for deviation from the economy of labor time. Nor is this all.

In its development from prices of production to monopoly prices, capitalism is constantly deepening and multiplying exchange disproportions, creating a growing gulf between commodity prices and values. But each increase in prices leads to a contraction of the market and subsequently to a contraction of the production of the given category of goods, while a corresponding reduction of prices for other goods, raising the demand for them, stimulates increases in their production. Consequently, out of exchange disproportions there inevitably arise changes and disproportions in production. Sharp fluctuations in the expansion and contraction of the market produce a whole cycle which culminates periodically in a destructive crisis, paralyzing production, causing mass unemployment and other catastrophes. The proportionality required by the law of value is restored at some moment but only in order to reproduce in the following cycle the same disproportions on a greater scale and with the same consequences. Violation of the proportionality requirements are felt most tangibly during crises. At the same time these catastrophic disturbances contain in themselves the most severe punitive sanction for this violation of proportionality. In these cases, the spontaneous law of value truly exerts its regulating influence in the same way as the law of gravity does when it sends a house falling down on your head.

The manifestations of this law are entirely different under socialism. Here its manifestations are quite unique and it was no accident that it was referred to at one time as the "transformed" law of value. Fear of unduly arbitrary interpretations of this term led our economists to reject it later. However, this danger is not so great. Of course, some reckless bureaucrat could easily argue as follows: if economic laws may be transformed at will, then would it not be more convenient to annul them completely? But, paraphrasing a well-known proverb, it may be said that laws are not written for these bureaucrats. As for

rational people, they can easily understand that historical laws become transformed and that their forms of expression change not by the will of law-makers and not at "the wave of the wind," but by force of weighty circumstances, such as the replacement of entire social systems. For example, the victory of capitalism over feudalism "transformed" the law of value into the "law of prices of production," which is called by Marx even in the new form the "transformed law of value," because it preserves by continuity the basic functions of the same law in the old forms. And now, at the new stage of history, the victory of socialism over capitalism "transforms" the law of value into a new form, ensuring the planned use of this law in the interest of the socialist society as a whole. But it is not at all difficult to see in it the connection with the familiar "law of economy of time."

However, it is not a matter of how we label things. It is far more important to master the dialectics of the development of the corresponding concepts and their specific features at different stages of this development.

The October Revolution fundamentally uprooted all the foundations of the old world of class rule and exploitation. It has radically changed all social relations, turning them right side up for the first time; but this has caused no little trouble for Soviet economists who had to readjust themselves on the march and to create from scratch a theory of the political economy of socialism. Much that the Revolution has discarded in practice has yet to be overcome in theory, and some old features which have been retained with benefit of our practical work, contrary to many anticipations, must be newly assimilated in theory. In particular, this applies to commodity-money relationships during the first phase of communism.

Commodity relations have undoubtedly survived the socialist revolution to become firmly implanted in our new Soviet life. This is a fact which has to be reckoned with in theory. At first efforts were made to explain this fact by the existence of a mixed economic system in the period of transition to socialism. However, now that the full and complete victory of socialism has become a fact, it is clear that commodity relations have survived here not only at the interstices of different economic structures, but that they also remain in existence to perform highly important planning functions in the socialist economy as a whole. Serving the plan as instruments for building communism, their economic nature, of course, changes and they will be completely ousted by other forms of relations after their new role has been fulfilled to the end. However, neither money nor the law of value with all its basic functions in production and exchange can be outlived at the socialist stage; but they are preserved in a very specific form. This specific nature is expressed, first, in the fact that the law of value, freed from the influence of blind spontaneity, is subordinated to the plan of the socialist society, and is therefore expressed in the form of direct plan assignments of this society in its struggle with natiional economic disproportions.

Second, while under capitalism the spontaneous law of value, acting on production through the market, could only indirectly regulate through the medium of market prices the necessary production and labor proportions, in the planned economy the law of value is used in a planned manner and directly in coordinating these proportions with the balance of labor and material balances of production and consumption, so that in this case production proportions are used to determine exchange proportions.

Third, the spontaneous law of value, expressed only in the transformed form of prices of production, or in the still more distorted form of monopoly prices, could not ensure an adequate equivalence of exchange proportions. In the planned economy, where the people themselves have the monopoly right of establishing prices, their deviation fro values does not by any means stem from the requirement of social production; and in the absence of any obstacles t the observance of the principle of equivalence this require ment of the law of value may be observed with any degree of approximation desired.

Fourth, the spontaneous law of value expressed in the form of the law of equal rates of profit hinders technical progress, as noted earlier, and monopoly prices lead to stagnation and decay. Freed from this heritage of capitalism, the law of value, on the other hand, helps to quicken the rate of technical progress under socialism.

Fifth, in the selection of new projects for capital investment, the spontaneous law of value makes allowances only for the highest rate of profit, whereas when it is utilized consciously the law of value guides our choice in the direc tion of the minimum expenditure of the total of past and living labor. And this is an entirely different criterion. The bourgeois principle of profitability which, within the narrow limits of the law of equal rates of profit, depends to a greater extent upon the level of payment for labor than upon the level of planned technology, is an inadequate stimulus for the choice of advanced technology, because where payment for labor is low this technology becomes "unprofitable." On the other hand, free from all outside considerations, the principle of economy of labor time in its most consistent form, with the utilization of the law of value in planning, assures us the choice of the most effective variants for planned construction and the maximum acceleration of growth rates of labor productivity.

Sixth, the spontaneous law of value comes into operation only post factum, i.e., as the result of already existing disturbances of national economic proportions in the form of such disastrous "sanctions" as overproduction, crises, unemployment and hunger. Utilized consciously in planning, the law of value helps to prevent such disproportions and thus protects the national economy from incalculable losse and disasters.

Seventh and last, the spontaneous law of value expressed within the limits of purely material relations appears as a objective necessity forced upon men from without. When utilized in our planning the law of value reflects, without a veils, the social relations of men in production, and its sig nificance for society is inseparably connected with the consistently and consciously applied principle of economy of labor time. In other words, the dictates of the law of value are binding for us only because they are rational. Proportions are better than disproportions because they enable us to use our human and material resources more economically. In our use of the law of value we see no absolute categorical imperative which would rule out all other laws. We do not subordinate our plans unconditionally to the requirements of this law and we are prepared whenever necessary to subordinate the law itself to the plan, because the law of value operates within the system of all socialist laws. Furthermore, there may be cases when even the principle of economy acquires secondary importance. But once we have included in the plan definite dictates of the law of value they become strictly binding for us, because in this case they are assured the conscious backing of all the working people. And as a recognized necessity, the law of value without losing its internal cogency as a guiding economic principle acquires, in Soviet conditions, the force of generally binding juridical laws through the medium of the plan.

(Continued on Page 59)

(Planovoye Khozyaistvo — Planned Economy — No. 6, 1959)

Grebtsov:

ncerning the Elaboration of a Composite Material Balance*

mproved elaboration of the system of material balances ne of the most important means for further improving planning of the national economy of the USSR. The bal- e of the national economy reflects the process of ex- ded socialist reproduction and, first and foremost, the ty of production, distribution, circulation (exchange), and sumption of the total social product. Material balances ng the planning of the process of reproduction of the so- l product to the point of revealing the interrelations in production and consumption of the different concrete ds of means of production and objects of consumption. s this factor that characterizes their special purpose and great role they play in planning the national economy. No wonder that the elaboration of material balances be- at the earliest stages of state planned management of national economy. While drawing up the first long-term ional plan (GOELRO) they already served as one of the portant means of substantiating the production volumes l rates adopted. The number of material balances in- eased from year to year and now stands at more than 000.

Methods of drawing them up have been improving, as well. rious improvements in the methods of drawing up mate- l balances have occurred, but in particular these im- vements have been in two directions:

First, there was a methodological improvement in the del of the material balance which more adequately re- cted available resources according to the sources of their mation, and distribution according to the main channels consumption; particular attention was paid to a deeper dy of the structure (by branches) of commodity consump- n both in the country as a whole and in the Union repub- s;

Secondly, the quality of standard norms for raw-material ut in production and construction was improved and the verage of standardized consumption expanded. Neverthe- s, the level of material balance elaboration still lags in ny respects behind new requirements in the planning of national economy stemming from the reorganization of nagement in industry and construction according to the rritorial principle. Neither the structure (by branches) requirements in the administrative economic districts r the equipment requirements for the entire national econ- y are being adequately studied yet.

The elaboration of a composite material balance for the tional economy covering the different branches and dis- cts will be an important condition for a successful tack- g of this problem. This balance, drawing on and develop- the individual material balances, should reflect all the st important inter-branch and territorial links in the pro- ction and consumption of means of production, as well as consumers' goods, and should determine with sufficient mpleteness and accuracy the essential proportions in the velopment of the key branches.

In 1957 the Economic Research Institute of the USSR ate Planning Committee began to work out a model of such a balance sheet and the method of preparing it. The long and varied experience gained by the USSR State Planning Committee in elaborating individual material balances and equipment balances has been serving as the basis for this work. At the same time a system of linear equations, which had recently found practical application in some economic calculations with the appearance of electronic computers, was utilized.

The elaboration of the composite material balance requires the solution of a number of practically essential and methodologically difficult problems, such as:

(1) Finding the most acceptable balance sheet scheme and determining the methods of its compilation.

(2) Correctly classifying the production and consumption of commodities and, in this connection, determining the nomenclature of the current and planning balance.

(3) Using linear equations and electronic computers to elaborate methods for calculating the norms (by branches) of full input of material resources per unit of output or final consumption and on this basis determining the necessary output of objects of labor.

(4) Determining the peculiarities involved in the methodology of calculating the equipment and material input required for capital construction.

An examination of these issues in the same sequence follows.

(1) A Model of the Composite Material Balance and Its General Characteristics

The model of current individual material balance sheets, worked out by the USSR State Planning Committee and conventionally adapted to the use of linear algebra and electronic computers, underlies the elaboration of the composite material balance sheet model (see table 1 on the following page).

Despite its shortcomings, this model makes it possible to reflect, more or less fully, the connections prevailing in the different branches of industry in respect to delivery and output of the means of production. Given current statistics of consumption by branches, this scheme is perhaps the most that is possible in practice.

Of course, in this form the current model of individual and composite material balances cannot be methodologically directly correlated with the model of the chessboard-type social product balance sheet whose integral and most important part must become the composite material balance. It cannot be done because it does not separately reflect either the fund for replacing consumed resources or the fund for expanding production. This circumstance limits the use of material balances in preparing the social product balance sheet. That is why the successful elaboration of the chessboard-type balance sheet of the social product requires supplementing the model of individual and composite material balance sheets with separable calculations of the fund for replacing consumed resources and the fund for expanding production.

*Submitted for discussion.

SUMMARY TABLE OF THE MATERIAL BALANCE SHEET (Conventional Figures) — Table I

	Unit of measurement	Resources				Distribution (consumption) of commodities for current production											Final Consumption		
			Including			Industry													
		Total	production	excess of exports over imports	other sources	electric power	conventional fuel	rolled steel	timber	cement	soda ash	caustic soda	mineral fertilizers	textiles	other needs	transport and communications	agriculture	capital construction	replenishment of reserves and stocks	public and personal consumption
		A	B	C	D	1	2	3	4	5	6	7	8	9	10	11	12	I	II	III
Electric power	billion kwh.	476.5	476.5	-	-	59.2	38.0	47.5	7.6	6.2	0.3	3.4	8.7	12.2	153.2	15.1	11.3	16.6	-	57.0
Conventional fuel	million tons	1194.3	1105.7	+6.7	81.9	225.5	55.5	268.8	0.4	13.0	1.6	1.0	0.6	6.4	234.3	214.3	14.9	13.5	1.3	134.2
Rolled steel	million tons	90.0	91.8	- 4.2	2.4	0.07	1.8	20.8	2.5	0.2	-	-	-	-	41.0	5.4	0.5	13.3	1.3	1.8
Timber	million cu. m.	610.4	608.4	- 18.5	20.5	2.0	49.6	7.8	14.8	0.3	-	-	-	0.6	224.5	31.2	6.2	161.6	47.3	61.6
Cement	million tons	66.4	63.0	+2.0	1.4	0.01	1.1	0.009	-	-	-	-	-	-	6.2	-	0.06	53.5	-	5.5
Soda ash	thous. tons	4180.1	4020.8	+130.2	29.1	22.4	10.1	84.0	1.1	1.0	120.4	515.2	74.2	61.0	2692.9	62.2	7.5	2.1	71.5	136.4
Caustic soda	thous. tons	1596.6	1559.6	+12.1	24.9	3.0	10.1	33.6	2.0	0.3	-	9.8	-	89.6	1257.6	43.3	2.7	1.6	41.3	1.4
Mineral fertilizers	million tons	28.4	28.2	- 0.5	0.7	0.007	0.5	0.2	0.01	0.002	0.003	0.06	0.3	0.077	0.7	0.03	25.7	0.01	0.6	0.1
Textiles	million meters	21105.2	20012.1	+152.1	941.2	10.8	65.2	29.7	53.4	2.9	0.5	0.6	1.1	394.4	6861.7	73.9	305.3	84.1	0.01	12872.7

order to check the suitability of the composite mate-
balance model to be prepared from materials of the
e Planning Committee, an experimental composite ma-
al balance sheet was drawn up for 1955.
welve objects of labor were included in the experimental
posite material balance sheet: electric power, conven-
al fuel, rolled metal, copper, aluminum, rubber, min-
l fertilizers, soda ash, caustic soda, timber, cement,
nical fabrics. It also contained the following items
n balances of labor implements: balances of turbines,
er-engineering boilers, equipment for ferrous metal-
y and machine building. In preparing the experimental
nce sheet for 1957 the Economic Research Institute of
USSR State Planning Committee already included nine-
objects of labor, the output of the machine building in-
try and also three groups of consumers' goods.
tudies have shown that linear equations solved with the
of electronic computers may be applied both to a series
alance estimates expressed in value terms and in the
paration of a composite material balance expressed
nly in kind, as long as each type of output is expressed
he same units of measure both horizontally and verti-
y.
he elaboration of the composite material balance sheet
ressed in kind, with the use of linear algebra and elec-
nic computers, is of great importance in planning the
duction program and inter-branch relationships. Be-
es, it will provide a firmer basis for the preparation of
social product balance sheet expressed in value terms.
ould be no exaggeration to say that it will be a new and
portant method of scientifically substantiating the volume
rates of growth in social production.
he composite material balance sheet expressed in kind,
as the individual material balances, must provide an
wer to the following questions: what objects of produc-
n, what implements of labor, what quantities and what
portions, are required in production to meet the coun-
's needs, and how is their exchange (circulation) to pro-
d between the two subdivisions of production and within
h of these. Having combined all these data into a com-
ite balance sheet, it will then be easier to recalculate
terial inputs and services in value terms on the basis of
ces and freight rates, to add workers' and office em-
yees' wages, peasants' incomes, profits of enterprises
the state, and thus to calculate a balance sheet of the
ial product.
t was with due consideration of the possibility of origi-
ly preparing a composite material balance sheet in kind
t the model and the methods of drawing it up were elab-
ted.
Arranging in one table a number of individual material
ances horizontally, we obtain the completed basic table
the composite material balance. (See table 1 on page 10.)
The simple arrangement of many (and in the future of hun-
eds) individual material balances in one summary table is
considerable interest, for it facilitates an examination and
alysis of the economically and technically determined pro-
ctions and interrelations between the branches reflected
these balances.
Such a table shows:
First, the ratio between the aggregate social demand for
given commodity, conventional fuel for instance, and the
urces for meeting it, and first of all, the level of its out-
t;
Second, the proportions prevailing in the distribution of
given commodity:
(a) for current production by branches, for instance con-
ntional fuel for the production of electric power, rolled steel, copper, rubber, etc. Actually, the demand for fuel within the fuel industry for extracting the fuel, as well as for coal dressing and briquetting done directly at the mines is also included in this demand;

(b) for everything else, conventionally called "final consumption," chiefly for the reproduction of fixed capital including unproductive funds, and partly for replenishment of state reserves and stocks, for public and personal unproductive consumption.

However, the reduction of individual balances to a single common table does not cover the whole significance of the composite material balance. Since the process of production of certain means of production, say the mining of conventional fuel, is at the same time the process of consumption of other means of production, for example electric power, timber (mine timbering), etc., each of the other balances, for instance those of electric power, timber, etc., reflect the production expenses of these branches for the production of the given commodity, which in our example is conventional fuel. That is why the horizontal lines in the balance summary table form vertical rows which reflect the input of all other branches for the production of each of the given distributed commodities, a factory which in no way is reflected in each individual material balance, taken separately.

The vertical rows in the balance sheet stand opposite a given commodity in the horizontal lines, marked by a corresponding identically numbered index. Thus, opposite "electric power" with index one in the horizontal line, there is a vertical row of inputs by all other branches necessary for its production: 59.2 billion kilowatt-hours of electric power, 225.5 million tons of conventional fuel, 70,000 tons of rolled steel, 2 million cubic meters of timber, 10,000 tons of cement, 22.4 thousand tons of soda ash, 3,000 tons of caustic soda, and 10.8 million meters of technical fabrics.

By dividing the absolute inputs of all other branches alternately into the production of each given commodity we obtain the table of so-called branch (average) norms of direct inputs, which are similar to the norms for the consumption of fuel, electric power, rolled steel, copper, etc. that have been employed for decades in elaborating the yearly and long-term balance sheets in the USSR.

The use of electronic computers has made it possible to transform, by means of a linear equations system, the table of norms for direct inputs into a table of branch norms, so-called total input norms of commodities produced by all interrelated branches per unit of production, or "final consumption" of the given commodity. (See table 2 on the following page.)

The conception of total input norms implies the following: let us assume that 250 billion kilowatt-hours of electric power are to be produced in the given year. If the specific expenditure of conventional fuel per 1 kilowatt-hour of electric power is 450 grams, then the total input of conventional fuel directly for electric power production will amount to 112.5 million tons. These are the direct inputs. But besides these expenditures, a certain quantity of fuel is involved in the manufacture of the boilers and turbines that are delivered to operating electric power stations to replace those out of service. This, in turn, will require fuel for the manufacture of machines that are necessary for making turbines and producing the rolled steel used for manufacturing turbines, machines, and so on. Moreover, fuel is burned in the locomotives that deliver coal to the electric power stations, fuel is consumed in the repair of the locomotives and railway cars used for these purposes, etc. All this is the indirect input of coal essential for the production of electric power. The sum total of direct and

RATIO OF COEFFICIENTS OF DIRECT AND TOTAL INPUTS ACCORDING TO PRODUCT

BRANCHES OF THE INDUSTRY OF THE USSR FOR 1955

Table 2

	Period	1	2	3	4	5	6	7	8	9
1. Electric power, kwh.	Direct input	0.12415799	0.2344017	0.51733910	12.47123600	0.09856787	0.08774373	2,18491904	0.30753965	0.61133454
	Total input	1.17328400	0.04528860	1.11742000	15.71798000	0.12879670	0.12549100	2.67053000	0.36595450	0.74710090
	Ratio of total input to direct input	1.396	1,932	2.160	1.260	1,307	1.430	1.222	1.190	1.222
2. Conventional fuel, kg.	Direct input	0.36433000	0.03337900	2.27836000	0.69300000	0.16791500	0.31100300	0.65350000	0.02152300	0.00031894
	Total input	0.59433520	1.08261400	4.60659000	10.50510000	0.29734170	0.50490160	2.21375700	0.20971280	0.38573770
	Ratio of total input to direct input	1.631	2.475	2.022	15.159	1.771	1.623	3.388	9.744	1209.437
3. Rolled steel, kg.	Direct input	0.00014926	0.00194674	0.22633776	0.40819100	0.00305106	----	0.00394973	-----	-----
	Total input	0.00317490	0.00235240	1.31131800	0.59326060	0.00480670	0.00126910	0.01420950	0.00104260	0.00208950
	Ratio of total input to direct input	21.271	1.208	1.375	1.453	1.575	-----	3.598	-----	-----
4. Timber, cu. m.	Direct input	0.00000411	0.00005874	0.00008544	0.02439000	0.00000445	-----	-----	-----	0.00002798
	Total input	0.00003240	0.00004980	0.00033110	1.02563300	0.00001910	0.00002370	0.00011380	0.00001130	0.00005070
	Ratio of total input to direct input	7.883	0.848	3,875	1.051	4.292	-----	-----	-----	1.812
5. Cement, kg.	Direct input	0.00002703	0.00015598	0.00009459	0.00092000	------	-----	-----	-----	-----
	Total input	0.00061490	0.00103360	0.00459140	0.01166900	1.00289000	0.00048640	0.00222080	0.00021500	0.00039850
	Ratio of total input to direct input	22.749	6.626	48.540	12.684	-----	-----	-----	-----	-----
6. Soda ash, kg.	Direct input	0.00004701	0.00000896	0.00091540	0.00184100	0.00001646	0.02994429	0.33034109	0.00262897	0.00305017
	Total input	0.00007250	0.00002120	0.00186130	0.00564470	0.00003720	1.03088700	0.34298680	0.00276040	0.00482710
	Ratio of total input to direct input	1.542	2.366	2.033	3.066	2.260	1.031	1.038	1.050	1.583
7. Caustic soda, kg.	Direct input	0.00000623	0.00001062	0.00036616	0.00322100	0.00000445	-----	0.00628366	-----	0.00447731
	Total input	0.00001480	0.00001200	0.00062650	0.00442230	0.00001070	0.00000730	1.00637100	0.00000540	0.00461030
	Ratio of total input to direct input	2.376	1.130	1.711	1.373	2.404	-----	1.014	-----	1.030
8. Mineral fertilizers, kg.	Direct input	0.00001440	0.00040950	0.00241058	0.01748700	0.00035581	0.00069638	0.03770197	0.00968254	0.00036378
	Total input	0.00027240	0.00045640	0.00521910	0.02469170	0.00049760	0.00093980	0.03954810	1.00987400	0.00073060
	Ratio of total input to direct input	18.917	1.115	2.165	1.412	1.398	1.350	1.049	1.020	2.008
9. Textiles, m.	Direct input	0.00002268	0.00005858	0.00032424	0.08769500	0.00004670	0.00013266	0.00032136	0.00003793	0.01973205
	Total input	0.00007730	0.00008550	0.00088870	0.10342810	0.00008230	0.00019540	0.00069420	0.00008290	1.02038700
	Ratio of total input to direct input	3.408	1.460	2.741	1.179	1.762	1.473	2.160	2.186	1.033

irect inputs for the production of a unit of output yields total inputs.

Thus, the elaboration of the composite material balance eet for a current period involves, in practice, the drawup of the following three tables:

(1) Table that shows the distribution and consumption of ch given commodity in other branches and the total inputs e to economic and technological requirements made by all ier branches for its production in absolute magnitudes e table 1 on page 10).

(2) Tables of branch norms of direct inputs for the proction of a unit of output calculated with the aid of ordinary ans of calculation (see table 2 on page 12), and,

(3) Tables of branch norms of total inputs per unit of tput or "final consumption" that have been calculated by ans of a system of linear equations solved with the aid electronic computers (see table 2).

Let us assume that a table of total inputs for 1959 has en drawn up. In this case, provided that we make some rrections in the initial norms of direct and, correspondgly, in total inputs, it may be used for two purposes:

First, for choosing the most favorable volume and struce of production in interrelated branches for the draft plan 1960;

Secondly, for defining it more exactly in case the volume production in the given branch or group of branches anges.

In case it is necessary to elaborate the norms of direct d total inputs for a long-term period, the table of total ints may, evidently, be used to determine the most rational lume of production for a long-term planning period, as ell.

Subsequent studies will define more accurately all the ncrete methods of applying the composite material balce sheet to working out the necessary volumes of produc-on. Investigations have shown this balance sheet to be apicable in practice provided:

(1) that, besides the norms of direct inputs, the "final nsumption" is known in advance, mainly the volume and rection of capital investments by branches;

(2) that, on the other hand, the volume of production of e given commodity is fixed beforehand;

(3) that the "final consumption" is known as regards one rt of the output, and the volume of production as regards e other part.

Possessing data, for example, on the "final consumption" d norms of direct inputs, one has but to find the norms total inputs and, through these, the volume of production all branches.

This is determined by the following formula:

$$X_i = \sum_{j=1}^{n} a_{ij}x_j + y_i (i = 1,2,3...n),$$

here: 1 — is the number (index) of the branch that has made the commodity;

j — the number of the branch it is to go to;

x_i — the gross output volume of the 1-branch;

a_{ij} — the norm of consumption of the commodity produced by the i-branch used for current production per unit of gross output in the j-branch;

y_i — the final consumption of the commodity in the i-branch.

Proceeding from this general formula, we may now haracterize in greater detail the production and consumpon in some individual branch, say the fuel industry in our xample, and then in all branches. In the first case the near equation will take the following form:

$$X_2 = (a_{21}x_1 + a_{22}x_2 + a_{23}x_3 + ...a_{2n}x_n) + y_2,$$

where: X_2 — is the gross output of conventional fuel;

x_1, x_2...the volumes of the commodity produced in the fuel consuming branches, i.e. of electric power (x_1), rolled steel (x_3), etc.; x2 represents the volume of intra-branch consumption, in this case of coal for its mining, briquetting and dressing directly at the mining site.

The figures 1, 2, 3 in the volume of gross output and "final consumption" represent the number of the given commodity in the horizontal line;

n — the number of branches (commodities) included in the composite balance sheet, that produce objects of labor;

a_{21}, a_{22}, $a_{23}...a_{2n}$ — the branch norms of direct inputs per unit of output. The first row of indices (number 2) represents the ordinal number of the commodity consumed as listed in the composite balance sheet, while the second row of indices (1, 2, 3...) — the ordinal number of the branch (output) of the consumer. If we apply this to the given example, a_{21} represents the norm of direct inputs of conventional fuel per unit of electric power production; a_{22} — the norm of direct inputs of conventional fuel per unit of conventional fuel production, and a_{23} — the norm of direct inputs of conventional fuel per unit of rolled steel production;

y_2 — is the final consumption, in our case of conventional fuel.

For the solution of the entire composite material balance by a mathematical method, there should be as many equations as there are types of commodities included in the balance:

$$X_1 = (a_{11}x_1 + a_{12}x_2 + a_{13}x_3 + ... + a_{1n}x_n) + y_1$$
$$X_2 = (a_{21}x_1 + a_{22}x_2 + a_{23}x_3 + ... + a_{2n}x_n) + y_2$$
$$X_3 = (a_{31}x_1 + a_{32}x_2 + a_{33}x_3 + ... + a_{3n}x_n) + y_3$$
$$\vdots$$
$$X = (a_{n1}x_1 + a_{n2}x_2 + a_{n3}x_3 + ... + a_{nn}x_n) + y_n$$

In the given system the components of the equation $a_{11}x_1$, $a_{22}x_2$, $a_{33}x_3...a_{nn}x_n$ are the expressions of the inputs of each branch for its own needs.

The components of equations $a_{12}x_2$, $a_{13}x_3$ .... $a_{1n}x_n$, $a_{21}x_1$, $a_{23}x_3$, $a_{2n}x_n$, and $a_{31}x_1$, $a_{32}x_2$, $a_{3n}x_n$ represent the inputs of each branch for the production of commodities of other branches.

The components of equations y_1, y_2, y_3 ... y_n — represent the "final consumption" of each given product.

The number of unknowns in the system corresponds to the number of equations. At the same time we have to determine the volumes of gross output. To do this we use a matrix, that is, a table consisting of branch norms of direct inputs.

The matrix of direct input norms:

$$\begin{matrix} a_{11} & a_{12} & a_{13}... & a_{1n} \\ a_{21} & a_{22} & a_{23}... & a_{2n} \\ a_{31} & a_{32} & a_{33}... & a_{3n} \\ . & . & . & . \\ . & . & . & . \\ . & . & . & . \\ a_{n1} & a_{n2} & a_{n3} & a_{nn} \end{matrix}$$

This matrix of direct input norms is used to calculate a table of total input norms by means of the following formula:

$$B_{ij} = a_{ij} + \sum_{k=1}^{n} B_{ik}a_{kj} (i = 1, 2, 3 \ldots n;\ j = 1, 2, 3 \ldots n),$$

where: B_{ij} — total inputs of the i-branch;
a_{kj} — direct inputs per unit of final consumption of the commodity produced by the j-branch;
$\sum_{k=1}^{n} B_{ik}a_{kj}$ — indirect inputs per unit of final consumption of the same j-branch commodity.

In this case the indirect, and then all other, i.e., the total inputs are determined by a linear algebra method with electronic computers.

Having determined the total inputs per unit of "final consumption" by the usual means of calculation, we obtain the volume of gross output for all branches:

$$X_1 = B_{11}y_1 + B_{12}y_2 + \ldots + B_{1n}y_n + y_1.$$

This last calculation may be repeated as many times as is necessary in practice, proceeding from the different variants of "final consumption."

There is another, in some respects easier, method for solving the given system of linear equation with the aid of the so-called inverted matrix.

(2) Classification of the Production and Consumption of Means of Production and the Balance Sheet Nomenclature

The elaboration of a composite material balance sheet requires the proper classification of the production and consumption of the means of production and the choice of its nomenclature.

At present the production of commodities in kind is taken into account by the Central Statistical Administration of the USSR for some of the most important kinds of means of production. The underlying principle involves the grouping of commodities according to their basic feature, i.e., by their economic designation. The similarity of the raw material consumed and the character of the technological process are taken into account at the same time. In spite of some shortcomings in the adopted classification of production, it is superior to one based on the similarity of the technological process which has been the chief one adopted by bourgeois economists for making balance calculations.

As to the consumption of means of production, it is unfortunate that it is not being taken into account by branches.

Investigations have shown that, when preparing the composite material balance sheet expressed in kind, it is essential that not only production, but also consumption should be determined for concrete commodities, i.e., the actual interrelations in the production and consumption of definite kinds of means of production should be determined.

When elaborating balance calculations characterizing the production interrelations of different branches, bourgeois economists usually forego indices in kind not because the latter are of no use. They prefer to use value indices for these purposes primarily because they do not have individual material balances at their disposal, and no composite material balance in kind is possible without them.

It is altogether different when the balance of the entire social product is being worked out. In this case it is but natural to recalculate all material inputs in kind and into value terms. Such a balance is essential as a component part of the national economy balance sheet and for coordinating the output of equipment with capital investments.

In working out the yearly plan of the national economy the nomenclature of the composite material balance should be as detailed as possible both for the objects and instruments of labor. For example, when the yearly national economic plan is being prepared a more complete and detailed identification of the production and consumption of rolled steel is worked out, whereas in a long-term plan it is sufficient to show rolled steel as a whole and some of its most important types.

In elaborating the yearly national economic plan it is necessary to enumerate not only all the main items of technological equipment and transport facilities but to divide each of them in turn, to the extent that it is possible in practice, into sub-divisions, types, dimensions, etc. When drawing up a long-term plan it is quite sufficient to include consolidated items in the balance sheet, for instance tractors expressed in terms of 15-h.p. units, grain combines, etc.

The experimental composite balance sheet for 1955 and for 1957 elaborated by the Economic Research Institute of the USSR State Planning Committee showed that a broader nomenclature permits a better coordination between the demand for a given commodity and its output, and this is of utmost importance. Depending on improvements in the accounting and planning of the branch structure of consumption, this nomenclature must be gradually extended in the composite balance to several hundred commodities. It must include the material resources and equipment which are of great importance to the national economy.

The nomenclature of the balance sheet must depend on the economic function of the given commodity, on the character of the actually existing inter-branch relations in its production and consumption, and should be reflected in the structure of consumption of the given product. For example, from the structure of the conventional fuel balance we see that electric power, ferrous metallurgy, machine building, municipal economy, and transport are the chief consumers of fuel.

Thus, the composite balance sheet in kind must necessarily contain a broad nomenclature of output to be determined with due consideration for the structure of its consumption. It is only under such circumstances that the norms of total inputs will reflect the actual total inputs and it will be possible to make use of them in practice for determining the necessary production volumes for the following planning period.

(3) Methods of Calculating Branch Norms of Direct and Total Inputs of Objects of Labor

It is the methods of calculating norms of direct inputs of objects of labor for the production of commodities that must be found first when elaborating a composite balance sheet.

If we isolate from the total balance the interrelations of branches in the current production of objects and instruments of labor and examine them separately from the reproduction of fixed capital and other items of "final consumption," these interrelations will take the form marked out in the experimental composite material balance (see table 1 on page 10).

It is within this part of the balance sheet that the distribution of each given product for the production of goods in other branches and the latter's input for its production are shown.

Two conditions must be adhered to in order to correctly obtain the branch norms of direct inputs:

(1) Regardless of the administrative subordination of th

enterprise, the entire demand (consumption) for raw-material and fuel-and-power resources for the production of similar commodities must be determined, i.e., the whole branch must be represented. Here, in one case consumption by branches is understood as referring to the input of certain objects of labor for the production of one commodity only, for example, for the production of electric power. In the other case, for instance, by the expenditure of electric power for rolled steel manufacture we mean its input not only for the rolling proper, but also for metallurgical production as a whole, beginning with the mining and dressing of iron ore and up to the manufacture of commercial rolled goods, pipes, metal ware, etc. This applies equally to the extractive branches, to the production of a number of nonferrous metals, chemicals, timber material, etc.

(2) The calculation of demand (consumption) for the prospective period must be done according to newly elaborated progressive branch norms of direct inputs. Here, by the term progressive norms of direct inputs of raw-material, fuel-and-power resources we refer not only to the inputs per unit of commodity, which in such cases as, for example, metal-cutting tools, may increase, but also per unit of their capacity, productivity, load-lifting capacity, transport facilities, etc., where these inputs, as a rule, are declining.

As in the working out of the individual balance sheets, the calculation of the demand for concrete kinds of similar commodities underlines the deviation of branch norms of expenditure of direct inputs in the composite balance sheet. For the base current or prospective period this calculation is done by multiplying the technical norms by the production volume of each kind of product, for instance, the norms for sawn timber by the corresponding type of freight cars. The sum of requirements established for the individual types of freight cars yields the total requirements for sawn timber for their total output. The division of the first by the second gives us the branch norm of sawn-timber input per freight car.

To prepare a composite prospective material balance sheet it is necessary to work out, through the research institutes of the various branches, the norms for the production of commodities that involve the consumption of great quantities of materials. When doing this, due consideration should be given to the technical progress being achieved in the national economy because this has a considerable influence upon changes in initial technical norms for any particular commodity. Structural changes in production and improvements in the quality of the initial raw material will also have a marked effect.

The elaboration of prospective branch norms of direct inputs (consumption) is an extremely complex and responsible job in the drawing up of the entire composite material balance sheet. Its complex character lies mainly in the difficulty of forecasting the technical progress to be attained in a given branch and, consequently, in the changes in design or production technology of the future commodity. However, the branch research institutes are able to determine with a certain degree of approximation the outlines of its future design and of the technology of its manufacture. Another difficulty stems from the transition from individual norms to average branch norms.

The elaboration of branch norms of direct inputs of objects of labor is the point of departure for finding the total input norms.

The calculation of total input norms is a qualitatively new factor in the elaboration of material balances. They will provide the opportunity for determining requirements for the production purposes of the national economy more rapidly and, what is especially important, more accurately, because such norms make it possible to derive indirect inputs to a fuller degree.

Calculations showed that for 1955 the total inputs of conventional fuel per unit of electric power generated exceeded direct inputs by 25% in fifteen interrelated branches alone.

With the extension of the balance sheet nomenclature this excess is sure to be greater. The excess of total inputs over direct inputs exists in the case of all objects of labor. Indirect ties appear even in the absence of direct inputs in some cases.

If in the production of one commodity the inputs are direct, then in the production of a succeeding commodity they will be indirect and vice versa. In our example the use of coal in the locomotives that deliver coal to electric power stations will be indirect for the latter and direct for railway transport. It is this property of objective interrelations between branches that underlies the possibility of employing a mathematical method for deriving the norms of total inputs.

All the norms of direct inputs are included in the calculation of each norm of total inputs, as the production of each commodity is directly, and more frequently indirectly, connected with the production of another commodity. That is why it is not surprising that the calculation of total input norms for fifteen kinds of commodities which had been included in the composite material balance for 1955 involved more than 250 thousand computing operations. The Laboratory of Control Machines and Systems of the USSR Academy of Sciences has calculated that a balance sheet comprising 100 items of commodities involved as many as 3 thousand computing operations for the derivation of each norm of total inputs, while the calculation of all the norms requires several millions of operations. In other words, the norms of total inputs cannot be practically calculated without employing electronic computers. The norms of total inputs are determined only by vertical rows that are independent of each other.

(4) Methods of Calculating Requirements of Equipment and Material Inputs for Capital Construction

In the experimental composite balance sheet the equipment was represented by single-branch power-engineering and metallurgical equipment. However, methods of calculating requirements were studied in respect to multibranch equipment too, for example in metal-cutting machine tools and also in machine building as a whole.

When including equipment balances in the composite material balance three important problems arise:

(1) How is the total stock of equipment required for the individual branches to be calculated for the planning period?

(2) How should additional requirements of equipment and, correspondingly, the extent of its yearly output be calculated?

(3) How is the total and relative input of the equipment itself for the output of commodities manufactured with the aid of the given equipment to be calculated?

Research has indicated possible ways and means of solving these problems. Theoretically this follows from a reckoning of the specific character of the participation of implements of labor in the process of production. Objects of labor, as we know, are used up within one production cycle, whereas implements of labor wear out gradually, in parts, usually in the course of a number of years. Consequently, the objects of labor generally participate in the production process almost entirely in the year of their

production, whereas the implements of labor participate physically — with almost the entire operating stock which has been accumulated in the course of a long preceding period.

This means that the total required equipment, for instance, turbines of all kinds, that are necessary for producing all electric power, should refer not to their output per year, but to the entire stock of turbines measured by their installed capacity involved in producing the electricity.

When operating the turbines at an average of 5 thousand hours a year for generating 170 billion kilowatt-hours of electric power in 1955, installed capacity of 34 million kilowatts of turbines was required. Applying this entire capacity of turbines to the total electric power generated in 1955 we obtain the ratio of installed turbine capacity to the consolidated unit of electric power production (per billion of kilowatt-hours):

34:170 = 0.2 million kilowatts.

If for the time being we accept this ratio as constant, we will not have much difficulty in using it to find the required installed capacity of turbines for the prospective plan period, as well. Let us assume that in the year for which we are planning there will be 300 billion kilowatt-hours of electric power produced. Correspondingly, the installed capacity of the turbines if they operate 5 thousand hours per year must be approximately:

300 x 0.2 = 60 million kilowatts.

It is necessary to subtract from this quantity the turbine capacity available at the beginning of the plan year, say 50 million kilowatts. Thus we obtain the capacity required for the increase in electric power production as compared with the preceding period:

60 - 50 = 10 million kilowatts.

In addition, to replace the turbines that go out of commission after, say, 25 years of service, will require:

50:25 — 2 million kilowatts.

Thus, the output of turbines, together with the replacement fund, will amount to 10 + 2 = 12 million kilowatts and, if exports and a reserve fund are taken into consideration, we get a total of, say, 15 million kilowatts.

Proceeding from this annual turbine output according to installed capacity, it is necessary to calculate the norms of direct, and then total inputs of objects of labor required for the production of turbines.

Here we get the tempting and realizable opportunity to calculate separately the inputs of objects of labor used for the production of implements of labor, for the replacement fund for consumed implements of labor, and for the fund designed for the expansion of production of one or another commodity. Since the annual production of equipment itself is calculated on the basis of a separate determination of the production expansion fund and the replacement fund, the chief prerequisite for separately deriving the demand for objects of labor has been created. But if the equipment required for the expansion of production is shown separately, it will also be easier to determine separately the inputs for the construction of buildings and structures, for the installation of this equipment, etc. Following this course we shall apparently be able to solve in a practical manner this theoretically complex problem which is of such great importance.

As to the inputs of the turbines themselves for the generation of electric power, these must be determined by the ratio of the capacities that are going out of commission, expressed in kind, to the total output of electric power:

2 million kilowatts = 300 billion kilowatt-hours = 6.7 thousand kilowatts per 1 billion kilowatt-hours.

This norm will probably also serve to calculate the total inputs of industrial equipment.

It should be noted that in calculating the equipment required and its input a number of complicating circumstances arise, particularly in calculating the replacement fund of industrial equipment.

As applied to turbines, the example that we have cited, of calculating the replacement fund, will be correct insofar as the newly produced turbines are assumed to be technically similar to those that go out of commission. But generally the newly produced equipment is always of a higher productivity than that which goes out of service. This difference depends on the length of the period for which the economic plan is being drawn up.

All this testifies to the necessity of calculating the replacement fund with a corrective factor for the higher productivity of new equipment as compared with that being replaced. It seems reasonable to assign this complicated work to branch research institutes. It is of great theoretical importance because it will make possible a greater degree of accuracy in determining, for the composite material balance and for the balance of the national economy, the actual fund for the replacement of implements of labor and the objects of labor that are essential for their production, and consequently in determining more accurately the production expansion fund, as well.

Of no less importance is the study of this problem for the solution of the practical tasks that arise in the preparation of the equipment balance in kind. Actually it is this part of requirements, i.e., the requirements for the replacement of obsolete types of equipment, that has up until now been determined without a sufficiently substantiated recalculation for productivity. And since the replacement fund accounts for a considerable portion of the annual output of equipment the entire equipment balance is still being worked out by insufficiently reliable methods.

In this connection the correct choice of the unit of measurement of the required equipment assures special importance. Apparently, such a unit for technological equipment must be a unit of its productivity; for example, the capacity of turbines in kilowatts, the productivity of boilers in tons of steam per hour, etc.

In determining the quantity of equipment required for any given branch of industry, it is essential to consider the extent of the actual use of existing continuously operating equipment (power-engineering, metallurgical, chemical equipment) and of that working in one or two shifts. Thus, we know that metal-cutting machine tools are utilized in Soviet machine building at an average shift ratio of 1.4, i.e. they operate about twelve hours a day. It is clear that if they are operated with a greater intensity, requirements for new machine tools will decrease.

The magnitude of non-installed equipment and the possibility of reducing the stock of non-operating equipment, as well as the possibility of its better utilization should also be correctly estimated.

In drawing up the composite material balance sheet it is necessary to find the most up-to-date methods of calculating the requirements for building materials for capital

construction. It should be noted that according to the data of the 1955 composite material balance, capital construction utilized a considerable share of raw material resources: 14% of rolled steel (without rails), 25.5% of timber, 80% of cement, and almost the entire quantity of all other building and roofing materials. The present-day giant scope of capital construction results in a sharp increase of demand for building materials.

There are two indices that are used as a point of departure in determining the demand for metal, timber, and cement for capital construction within a branch as a whole: the volume of building and assembly work and expenditures per 1 million rubles worth of building and assembly work. If the structural and technical changes in building construction, as well as the characteristics of transient construction and the methods employed in building construction itself are carefully reconsidered, such a calculation of total requirements for the individual branches is quite acceptable. The large number of building projects in a given branch compensates for the different levels of readiness of the similar individual projects, the degree to which they are incomplete, and consequently the defects of this norm.

However, under the new conditions of construction management, mass-scale construction work is not being undertaken within single branches in a number of republics and in most districts. The few projects in the given branch are in different stages of completion. That is why requirements for building materials for these republics and districts should probably be calculated chiefly according to the physical volume of basic construction work. This is to be given due consideration when the elaboration of the composite material balance reaches the territorial level.

Given the total inputs of materials for building and assembly work, it is not difficult to obtain the coefficients of direct inputs by branches. An idea which deserves attention has been suggested: in order to find the coefficients of total capital inputs per unit of increase in production or capacity, the table of coefficients of total inputs for production may be used.

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The drawing up of the composite material balance sheet will contribute to a considerable rise in the level of the economic groundwork of the national economic plans that are being drafted. The chief prerequisite for its compilation — the thousands of individual balances — already exists in the Soviet Union. It is necessary to utilize this truly scientific foundation which is available only in a planned, socialist economy for an all-around elaboration and improvement of the methodology of planning and accounting of inter-branch balance relations. It is necessary to pool the efforts of the Central Statistical Administration of the USSR and the USSR State Planning Committee for elaborating the current and planned composite material balance sheet and to improve the statistics of consumption (by branches) of means of production.

Having none of these prerequisites, bourgeois economists are vainly attempting to elaborate national prospective balances with the aid of so-called econometrics. A particularly great noise has been raised in the bourgeois press in recent years around the "input-output" balance table. W. Leontief, Professor at Harvard University, is said to be the author of the table. "Leontief's Table" is regarded by bourgeois economists as a virtual "new era," a "revolution," the most important event in economic science since the appearance of Quesnay's famous economic table.

The "input-output" tables have been used in previous periods to make forecasts of the development of individual branches over a number of years, of the possible direction of capital investments, the degree of employment of labor, etc. These calculations are used by private monopolies, state institutions and military departments. A special company — "Veg and Co." — has been created which gives economic consultations at the price of 20 thousand dollars and more. Leontief supervises these consultations.

The "input-output" table represents a balance table which is basically a copy of Soviet material balance sheets and of the balance sheet of the national economy,* but it is grouped and adapted to the conditions of "private enterprise."

In this table the economy of the USA is divided into a number of branches and so-called autonomous sectors ("government," "household," etc.). In the horizontal lines Leontief shows the "flows" of commodities distributed among the other branches and autonomous sectors, while the vertical rows reflect the inflow of goods and services from other branches into the given branch. The table is drawn up for a preceding period only.

Having divided the total inputs of other branches for the production of commodities of the given branch, Leontief, in an attempt to utilize the experience gained by the planning bodies of the USSR, has obtained branch norms of input, not in kind, however, but per dollar of the value of goods and services.

The attempts of bourgeois economists to present Leontief's table as a virtual instrument for planning the capitalist economy are completely untenable. These and other similar attempts cannot abolish the spontaneous and antagonistic functioning of the laws of the capitalist economy. These attempts sooner reflect the objective necessity for national economic planning but not its possibility and presence. At best, as W. Leontief's experience shows, bourgeois economists are able to elaborate an approximate table of relationships between various branches of industry for a preceding period and "extrapolate" the proportions of the past to the future. This provides forecasts of the possible development of individual branches, but these forecasts are provisional and far from accurate because they ignore the actual laws and inner contradictions that govern the development of capitalist economy.

In particular, the forecasts made on the basis of tables of inter-branch relationships ignore, as a rule, the inevitable crises in the capitalist economy, and in some cases these tables are even considered as some kind of means for eliminating crises. Meanwhile, no tables are capable of altering the nature of the capitalist economy and imparting a planned character to its development.

It is only the state power of working people and the social property of means of production that can serve as a basis for planning the national economy and, consequently, for employing the methods of economic management which are elaborated by science.

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* See: Transactions of the Central Statistical Administration of the USSR, Volume XXIX, Balance of the National Economy of the USSR for 1923-1924; T. B. Ryabushkin, Statistical Methods for Studying the National Economy, Statistical Literature Publishing House, 1957; A. N. Yefimov, Reorganization of Industrial and Building Construction Management in the USSR, State Publishing House of Political Literature, 1957.

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V. Cherniavskii:

An Attempt to Define the Efficiency of Capital Investment in the Iron and Steel Industry

The target figures of the economic development plan of the USSR for 1959-1965 approved by the 21st CPSU Congress provide for rapid rates of growth of the iron and steel industry. The creation of the material and technical base of Communism demands a further substantial increase in the production of metal, the key material of modern industry. In 1965 production of pig iron will reach 65-70 million tons, of steel 86-91 million tons, of rolled metal 65-70 million tons. The average annual increase in steel output capacities during the seven years will be between 4.4 and 5.1 million tons.

This rapid pace of development of the iron and steel industry is to be secured primarily by the construction of new and modernization of old plants. The sums allotted for the building of iron and steel works in the course of these seven years amount to approximately 100 billion rubles, which is about 2.4 times as much as was invested in this industry during 1952-1958. Iron and steel occupy one of the first places in the volume of capital investments allotted by industry.

The most rational use of the enormous funds to be invested in iron and steel projects is a matter of paramount importance. It is noted in the target figures of economic development of the USSR in 1959-1965 that the Communist Party attaches great importance to the most effective direction of capital investments with a view to allowing production capacities to be increased with a minimum of outlays and output to be increased in the shortest possible time with this being accompanied by a sharp rise in labor productivity and a decline in production costs.

In accordance with these principles, most of the investments in the iron and steel industry will be used to complete, expand and modernize existing plants, which will allow for a maximum output increase within the shortest possible time and with the least capital investments. Modernization and partial expansion of existing plants serve as one of the most effective means of increasing output without heavy capital outlays. This was stressed with fresh force by the decisions of the June Plenum of the CC CPSU.

The State Metallurgical Plants Designing Institute (Gipromez) has made an analysis of the comparative economic efficiency of capital investments in 26 of the largest iron and steel works, including newly built ones and those nearing completion or being modernized. The analysis rests on a computation of an efficiency coefficient based upon the ratio between the profit resulting from the realization of this or that building project and the capital investments required for them.

The concept of profit under socialism undergoes a fundamental change in its social-economic content; it serves as a most important index of social labor productivity in individual factories and industries. Socialist society is by no means indifferent to what effect, in the form of an increase of accumulation, the realization of one or another project of capital construction produces. "We are trying to produce a maximum of steel from a square meter of open hearth bottom. Why must we not strive to secure the highest possible effect from every ruble invested?" A. F. Zasyadko, Deputy Chairman of the USSR Council of Ministers, said at the 21st CPSU Congress. "Profit under capitalism is a result of exploitation and a source of personal wealth; in a socialist economy profit is a result of the conscious participation of the working people in the most rational organization of production, a source of expanded reproduction, a source of prosperity and culture for the Soviet people. This does not mean, of course, that the principle of efficiency in assessing the investments in industry should be given free play and obeyed blindly... The criterion of efficiency, in my view, should not be interpreted as a regulator but as a practical, sound and accurate mechanism for planning the national economy."

The application of the efficiency coefficient formula presupposes the existence of economically substantiated prices of the various products. With the diversity of prices and standards of profit existing in the various industries and enterprises under present conditions, the solution of the question of the most expedient investment of capital on the basis of the efficiency coefficient may lead to erroneous results in some cases. Hence, in applying the efficiency coefficient it is necessary to treat existing selling prices of goods critically, correcting them in the necessary cases in accord with real social costs of production. Provided this condition is observed, the efficiency coefficient serves as a safe guide in the choice of the most economical planning decisions.

What distinguishes the definition of efficiency based on a comparison of the mass of accumulation resulting from implementation of projects with the capital investments required, is that not only the degree to which the cost of production is reduced but the initial level of that cost is taken into account here. Thus, in modernizing the old Urals iron and steel plants a substantial reduction in costs may be achieved, and even if the saving resulting from this reduction alone is considered, the capital investments in modernizing the Urals plants will prove to be justified. Indeed, modernization of these works will result in a larger output, the cost of production also being reduced; but this cost will be above not only the average cost in the industry as a whole but also above that of the price-list. Hence, such capital investments would result in output growing but production costs remaining above the average for the industry. The method of assessing efficiency by comparing the rate of profit with capital investments makes it possible to take into account the initial production cost level and thus avoid decisions based only on a relative reduction of costs as compared with those which existed before the capital investments were made.

In his speech at the 21st CPSU Congress A. F. Zasyadko cited the following example: investments per ton of output at the Azovstal plant (second section) will amount to 1,080

ubles, and at the Dzerzhinsky plant to 1,170 rubles, or 90 ubles more. The cost of production of a ton of pig iron at zovstal is five rubles less than that at the Dzerzhinsky lant. Judging by this indicator, it would appear that construction of the Azovstal plant is more economical. However, if the efficiency coefficient of the capital investments s used in the analysis a different conclusion will have to be rawn.

Investments in the construction of the second section of ne Azovstal plant are estimated at 6,500 million rubles and ne yearly profit at 461 million rubles, i.e., the efficiency oefficient of the invested capital will be about 7%. The)zerzhinsky plant requires an investment of 1,700 million ubles and will yield an annual profit of 290 million rubles; ence the efficiency coefficient in this plant will be 16%. 'he supplementary capital investments in the Dzerzhinsky lant are thus more effective than those in the second section of the Azovstal plant. Further, the investments in the)zerzhinsky plant will begin to yield a return rather quickly while those in the Azovstal plant only after some years.

At first glance it seems puzzling that with greater relative investments and higher costs of production the efficiency coefficient of the capital invested in the Dzerzhinsky lant is higher than that in the second section of the Azovstal plant. The reason is that the capital investments in nodernizing the Dzerzhinsky plant will make it possible not nly to increase output but to reduce the cost of production f the whole output of the plant. The efficiency coefficient will reflect the substantial increase in profit resulting from he reduction of the cost of production of the entire output f the plant, and not only from that derived from the supplementary investments.

To determine the most rational direction of capital investments in the iron and steel industry for the coming period an attempt was made by Gipromez to calculate the efficiency factor in this branch of industry. The average coefficient for the capital to be invested in the construction of iron and steel plants proved to be equal to 9.5%. The calculation of the industry's coefficient, as well as all of our other calculations of capital investment efficiency, were based on existing list prices of the iron and steel industry products. Of course, the deficiencies of these prices makes these calculations somewhat inexact. But since the same prices are used in all cases the results of the calculations are mutually comparable. We also took into account the fact that in view of the expected reduction of the cost of production of iron and steel under the seven-year plan, prices will be brought closer to actual social costs of production. In those fields where the relationship between prices and production costs is not economically justified, it is best, in our opinion, for the purpose of calculating the efficiency of capital investments not to use the existing selling prices but special indicators calculated by adding to the cost of production the net income, the size of which is taken to be proportional to investments in fixed and working capital.

The simplest formula for the efficiency coefficient is as follows:

$$\text{Coefficient of efficiency} = \frac{m \times 100}{K}$$

where m is the profit and K the total capital investments.

The profit is equal to the difference between the proceeds from the output sold during the year and its full (commercial) production cost. Inasmuch as the calculations are made to determine the efficiency of the capital investments in the national economy, the cost of transporting the product to the point of consumption must be reckoned with in calculating costs.

The volume of investments is taken as the amount spent on the given object in accord with the general estimates minus the share contributed by other organizations and reimbursements as well as the sums spent on housing and cultural and welfare facilities. If the efficiency of investments is determined for some particular department, account must be taken of that part of the general plant expenditures which involve the given department.

Apart from the investments in fixed capital, the growth of working capital necessary for the normal operation of the enterprise must also be taken into account. In the iron and steel industry supplementary investments in working capital average 10-11% of the investments in fixed capital.

Taking into account all these additional factors, the full formula for calculating the efficiency of capital investments used in our analysis appears as follows:

$$\text{Coefficient of efficiency} = \frac{[S - (C + T)] \times 100}{K + K_w}$$

where S is is the proceeds from the sale of the product, C the cost of production, T the shipping costs, K the investment in fixed capital, K_w the increase in working capital.

A correct calculation of capital investment efficiency should also take into account the investments in related fields supplying raw materials, semi-finished goods and fuel. In iron and steel these fields are: coking and chemical production, mining of ore and fuel. In calculating the efficiency of capital investments, the expenditures for the output of the related industries should not be based on selling prices but on production costs after taking into account the volume of capital invested to develop the related industries.

Such are the principal methods employed by the State Metallurgical Plants Designing Institute in analyzing the efficiency of capital investments in a number of big iron and steel plants amounting to 184 billion rubles (106 billion rubles in the plants proper and 78 billion rubles in ore and coal mines). The most important part of the work consisted of converting to a comparable form the economic indexes for the various plants. The existing designs of the various iron and steel enterprises were drafted in non-comparable data, in prices relating to different years, with different methods used to substantiate the projects technically and economically. All subjective and accidental decisions had to be excluded as far as possible, and a technical-economic analysis of the efficiency of these projects had to be made on the basis of uniform prices and uniform methods.

The efficiency of the investments in the various plants was calculated on the basis of the whole sum of capital investments, including those already made and those still to be made. For purposes of comparability all investments were recalculated in prices of July 1, 1955.

The fourth conversion departments — the pipe, metal goods, finishing and cold rolled sheet iron departments — as well as the refractory and consumer goods departments, were excluded from the volume of output and consequently also from the volume of investments. The capital investments in each plant were calculated in the amount required to build the entire metallurgical complex, including agglomeration and coke-chemical production. Where the proposed production of pig iron is not secured by the existence of an agglomeration factory and a coke-chemical department within the plant, the investments in agglomeration and coking are conditionally computed for the entire volume of pig iron production in the plant. The investments in ore and coal mining are reckoned separately.

To obtain comparable indexes the cost of production of pig iron was determined in eacn particular case by specially computed indexes for the cost of blast furnace operations, with special reference to the quality of the ore and fuel. The expenditures on ore were taken at product cost plus shipping expenses based on the Ministry of Railways freight rates. One of the by-products of the factories processing phosphorite and vanadium ores is valuable slags. The cost of these slags was not taken into account in calculating the product cost of the basic products of the respective plants.

For purposes of comparison all rolled products were reduced to the basic assortment of commercial carbon steel. Selling prices were taken to be the same for all plants. The selling price of continuous hot-rolled sheet metal was reduced in the efficiency calculations to the level of section steel prices.

In the analysis of the efficiency of the capital investments the 25 projects considered were divided into three groups: newly-built plants, plants being completed, and modernized plants; the Magnitogorsk Iron and Steel Combine was considered separately.*

Specific Capital Investments per Ton of Reduced** Output by Groups of Plants (exclusive of capital investments in fourth conversion departments)

	Specific Capital Investments (in rubles)		
	In plant proper	In ore and coal bases	Total
New plants	1,199	1,036	2,235
Plants being completed	1,248	954	2,202
Modernized plants	1,274	875	2,149
Earlier capital investments	1,315	886	2,201

The table shows that the specific capital investments per ton of output in the plant proper decrease with the introduction of new, improved technology.

A contrary tendency is observable in the specific investments in the creation and extension of the raw materials base. The new plants have the most expensive raw materials, the plants under completion less so, and the old plants in process of modernization get the cheapest raw materials of all. Thus, the new plants in the South are being designed to use Krivoi Rog quartzite, production of which requires heavy capital outlays and the construction of special concentration mills. A number of plants designed to use high-quality ores from newly discovered fields are also marked by relatively high specific capital investments in the ore base, since the opening up of new fields naturally involves heavier outlays of capital than increasing output in existing fields.

If we determine the efficiency of capital investments on the basis of the above formula and compute the efficiency coefficient for all capital investments, including those mad in the past, the highest coefficient (7.9%) is shown by the new plants despite the fact that they include such notoriously uneconomical plants as the Cherepovets and Orsko-Khalilov plants. The efficiency coefficient ot the plants nearing completion is 5.3%. The latter group includes the Transcaucasian plant, the capital investments in which, with the present volume of output, are not being recouped. The efficiency coefficient for the relative old but modernized plants is 4.9%. The lowest efficiency coefficient (3.3%) is shown by the old capital investments.

From a practical point of view the estimation of the efficiency of future capital investments, i.e., of those to be made in the coming years, is of the greatest interest. The cost of modernizing existing plants, as related to a unit of increased output, is, as a rule, lower than the cost of building new plants. It must be remembered that in the process of modernization capital investments are used not only to increase capacities but also to renovate and modernize the existing equipment. Hence, to determine the efficiency of the investments in plant modernization it is necessary to single out of the total invested capital the sums used directly for increasing capacities. Below we present data on specific investments in new and modernized plants, with investments in new capacities being singled out among the modernized plants (in rubles per ton of reduced products):

	Total	Including cost of creating new capacities
New construction		
Kerch plant	1,326	1,326
Krivoi Rog plant (2nd section)	1,120	1,120
Novolipetsk plant	1,274	1,274
Karaganda plant	1,282	1,282
Modernization and expansion		
Makeyevka plant	1,140	935
Petrovsky plant	1,316	1,040
Magnitogorsk combine	1,222	954

The capital investments in incompleted plants are no less effective. These investments, by completing the building operations, drastically increase the efficiency of old investments. As stated above, the construction of the Trans-Caucasian plant as a whole proved economically unjustified. However, the use of the remaining investments allotted to this plant will be effective insofar as they put into operation the unfinished departments and substantially improve the operation of existing capacities. The plant will then cease to be unprofitable.

Below we present a list of 25 plants whose projects have been analyzed from the viewpoint of investment efficiency. The plants are listed in the order of diminution of the efficiency coefficient. Total investments are used for the new plants while forthcoming investments are used in the case

*Separate treatment of the Magnitogorsk Combine was due to the fact that it was difficult to classify the investments there, modernization, completion and new construction being carried out simultaneously.

**Gipromez has worked out a method for reducing the various products of the iron and steel plants to a comparable form by the use of special coefficients. Under this method the coefficient for pig iron is 0.4, for steel 0.5, for hot-rolled metal 1.0, etc.

f those nearing completion or being modernized.

Working capital and costs of transportation to points of consumption are not included in the calculations. Working capital, as noted above, amounts to 10-11% of fixed capital in the iron and steel industry. If working capital is added to the calculations the efficiency level for all the plants will decline more or less equally by about 10%.

An account of the cost of transporting the finished product to the points of consumption may appreciably affect the efficiency standards depending on the location of the plant. However, owing to the absence of well-founded calculations for the rational distribution of the products of the different plants by regions, this factor could not be taken into account in the calculation of the coefficient of efficiency.

Name of Plant	Coefficient of efficiency
"Zaporozhstal"	25.0
"Azovstal" (1st section)	22.8
Trans-Caucasian	19.6
Makeyevka	18.5
Dzerzhinsky	16.7
Magnitogorsk	13.5
Nizhny-Tagil (1st section)	11.9
Petrovsky	10.7
Taishet	10.2
Karaganda	10.0
Nizhny-Tagil (2nd section)	9.7
Krivoi Rog (1st section)	9.4
Novopiletsk	9.2
Kuznetsk	9.2
Barnaul	9.2
Voroshilov	8.9
West-Siberian	8.7
Chelyabinsk (carbon metal)	8.6
Ilyich	8.6
Yenakiyevo	8.6
Cherepovets	7.4
"Azovstal" (2nd section)	7.0
Krivoi Rog (2nd section)	6.6
Kerch	6.0
Orsk-Khalilov (carbon metal)	5.2
Average by groups of plants	
New plants	8.4
Completed plants	11.1
Modernized plants	12.8
Magnitogorsk combine	13.5
Average efficiency of all investments in the industry	7.6
Average efficiency of future investments in industry	9.5

Capital investments for the further development of the Magnitogorsk metallurgical combine and expansion and modernization of the "Zaporozhstal," Makeyevka and Dzerzhinsky plants and completion of such plants as "Azovstal" (1st section) and the Trans-Caucasian plant, produce the most effective results.

The figures given in the table are based upon existing list prices in the iron and steel industry. The question arises: Will these efficiency indexes not change in case of a change in prices? We have derived calculations based on the assumption that prices are fixed at a level which ensures a 15% average efficiency coefficient for industry, rather than 9.5% as is the case with the actually existing prices. The results of these calculations, while not fully coinciding with the results shown in the table, on the whole justify the same conclusion: investments in the Magnitogorsk combine are the most effective, followed by those in the modernized plants and plants in process of completion.

The results of the computation of the economic efficiency of capital investments in 25 big iron and steel plants lead us to the conclusion that modernization, expansion and completion of existing plants is more effective than construction of new plants. It was not by chance, therefore, that the target figures of the Seven-Year Plan provide for 67% of the investments in iron and steel and about 60% of the investments in non-ferrous metallurgy to be used for the expansion and modernization of existing plants, which are to yield more than three-fourths of the planned increment in pig iron, steel and rolled metal. The Magnitogorsk combine alone will step up its rolled metal output under the Seven-Year Plan from 5.2 to 8.5 million tons annually. This is the most profitable way of employing resources; it makes it possible to win time in the economic competition with the capitalist system.

If the construction of a new plant does not involve the emergence of new industrial regions and, therefore, also new metal-consuming areas, or exhaustion of the old raw material resources and the need for developing new fields, increased production of metal by the expansion, reconstruction and modernization of equipment at existing plants must be recognized at present to be the most efficient use of capital. We refer here first of all to plants such as the Magnitogorsk, Dzerzhinsky, Makeyevka and "Zaporozhstal," i.e., those in which capital investments show a much higher than average efficiency.

N. S. Khrushchev's report on the target figures of the economic development of the USSR for 1959-1965 says that steps taken towards a radical reconstruction, expansion and technical re-equipment of plants and renovation and modernization of equipment in many cases make it possible to solve the problem of increasing output with considerably smaller outlays of capital and more speedily than the construction of new plants.

American experience in developing the iron and steel industry deserves attention in this context. The U.S. steel producing capacity amounted to 86.6 million tons on January 1, 1945, 114.1 million tons on January 1, 1955, and 127.7 million tons on January 1, 1958. Between 1945 and 1958 steel capacity increased by 41 million tons. During this period only one big iron and steel plant was built, at Fairless Hills (near Morrisville), with a capacity of two million tons of steel and also several small processing plants with a capacity of half a million tons of steel each. The increase of capacity in the U.S. steel industry is being effected chiefly by the construction of new aggregates and modernization of equipment in existing plants.

The calculation of the efficiency coefficients provides an objective basis for adopting planning decisions and determining the most rational direction of capital investments. It goes without saying that the application of the efficiency coefficient as a resulting indicator does not rule out the analysis and application of other economic and technical indexes.

One cannot agree with the view that the application of the efficiency coefficient as a criterion in the choice of plans will lead to the investment of capital in small and technically backward enterprises, retarding the introduction of modern technology. We see no foundation for such claims.

As we illustrated above in the case of the old Urals plants, the defect attributed to the method based upon the use of the efficiency coefficient is not inherent in it. On the contrary, the efficiency coefficient improves with the introduction of modern progressive technology and up-to-date equipment. Technology cannot be progressive unless it helps to improve the economic indexes of industry. Truly progressive, modern technology is more advantageous and economically effective than the old outdated technology. Discounting the cost of experimentation and assimilation of the first samples in production, new technology may be regarded as progressive only if it results in a decrease of the socially necessary expenditures per unit of output, which ensures a high rate of expanded reproduction. The efficiency coefficient is an important criterion for determining how economical new technology is. Experience shows that the introduction of a new, progressive technology raises the efficiency of capital investments.

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An important economic problem connected with questions of capital investment efficiency is that of the period of construction. Excessive length of the construction period results in great material resources lying idle instead of being used in economic turnover, and thus retarding the rate of socialist reproduction.

At the 21st CPSU Congress it was pointed out how great are the losses to the economy from excessive building time. The construction of the Orsk-Khalilov combine began before the war. Today the capital investments in it amount to 1,300 million rubles, which is less than one third of its estimated cost. If we reckon these expenditures, including the losses to the national economy from the building delays and the idle capital, at the rate of 10% profit at compound interest, the total amount diverted to the construction of the Orsk-Khalilov works will run into 3,100 million instead of 1,300 million rubles.

The capital investment efficiency indexes must reflect the time factor in construction work. Thus, if there are two projects the realization of which will result in increased output and lower costs of production, the efficiency of capital investments in these projects must be calculated with a view to the time it will take to build them. The project which will take less time to complete is more efficient, other conditions being equal. In certain cases even higher specific investments may be accepted for the sake of the speediest consummation of the project. In order that the losses or gains involved in any change in building time may be fully reckoned, efficiency factor norms should be worked out for all industries.

Provision of material incentives to the building organizations to cut building time is an important condition for improving the economy and organization of building operations. The struggle to reduce the idle capital in uncompleted projects has so far been conducted chiefly by administrative measures. The building organizations show almost no interest in the speediest commissioning of the projects built by them. Yet both our own and foreign experience shows that there are great potentialities for cutting down building time in the erection of iron and steel units. It should be sufficient to mention the record time in which blast furnaces were built in the Ukraine in 1958. Foreign examples may also be cited. Thus the United States Steel Corporation began to build the large iron and steel plant in Fairless Hills on March 1, 1951; by the end of 1952 two blast furnaces, six open hearths and a cold sheet iron rolling mill had been put into operation, and the entire mill was completed in 1953.

In order to release the vast reserves for speeding up the construction of iron and steel plants and other industrial projects, it is necessary, in our opinion, to alter construction financing methods. Early commissioning of new industrial projects brings tremendous gains to the economy, the value of which in terms of money may be calculated on the basis of the efficiency coefficient in the given industry. In our view, an important role in reducing building time could be played by allowing the building organization which succeeds in advancing the building schedule to benefit by a part of the saving effected by this reduction. Conversely, in the event of building delays the building organization should be penalized by paying a proportionate share of the losses caused to the national economy by the delay in building operations. Should the delay be due to late delivery of necessary supplies, the organization responsible should be made to pay damages.

Such a system of financing would stress the importance of the building and assembling plans and help to improve cost accounting practices in the building organizations. Under this system it would be easier to discover the causes for idle capital resulting from delays in building operations compared to the established schedule. The profits and losses resulting from any change in the building schedule would indicate the quality of the building organization's work.

Winning time in the peaceful economic competition with the capitalist countries constitutes a cardinal problem of the seven-year plan in operation. A correct reckoning of the time factor in our economic development demands that a scientific method be developed and used to assess the efficiency of capital investments and to improve the economy and organization of the building industry.

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M. Bor:

Concerning Some Factors Determining the Rates and Proportions of Social Reproduction

The planned development of a socialist economy presumes the conscious establishment of proportions between the branches of production and between the social sectors in accordance with the requirements of the objective economic laws of socialism, and the corresponding establishment of the rates of development both of the branches separately and of social production as a whole. It is very important in planning practice to consider the following questions: What determines the rates of economic development during different periods? What are the objective grounds for changes in these rates? And what is the association between the level and rates of accumulation and the rates of growth in social production?

It was Marx who first demonstrated the interrelation and interdependence of accumulation and changes in social production in the general form embodied in his analysis of the patterns of expanded reproduction. With this analysis as a point of departure, we may elucidate several key problems of socialist expanded reproduction, in particular the following: the dependence of the rates of social reproduction on changes in the capital-output ratio; changes in the share of the national income in the social product; and the share of accumulation in the national income as a whole and in the main branches. An examination of these tendencies is exceedingly important in working out long-range plans for the development of the socialist economy.

Let us consider first the question of changes in the capital-output ratio or, in other words, changes in the relationship between capital and the social product. In this ratio both elements are complex ones. Capital includes both fixed and working capital, while the social product is the aggregate of the gross output of different spheres of material production, namely: industry, agriculture, building, transport and communications, trade, procurement and supply.

According to published statistics the USSR's social product has increased by roughly 13.8 times during 1928-1956. As far as capital is concerned, there are statistics only for the dynamics of the country's fixed capital. Therefore, we may only compare indices for the growth of the social product with indices for the growth of fixed capital. Between 1928 and 1956 the fixed capital of the USSR has increased by 10.9 times. Hence in the indicated period the ratio of capital to social production in the USSR has dropped to 78%. However, these data, which characterize the USSR's national economy as a whole, are not enough to elucidate and analyze the tendencies of the changes in the ratios between capital and the national product.

Of greatest economic importance is an analysis of the ratio between capital and output in industry, construction, and agriculture.

Let us consider the capital-output ratio in industry. The capital of this branch includes, as we know, two components which differ in the character of their turnover. These are: (a) fixed capital, and (b) working capital.

Suppose that in the case of fixed capital of 1,000 units with a ten-year turnover and of working capital of 400 units, the production cycle is one year in duration and the material costs incurred equal 50% of the price of the annual product. In this case, to produce output of 1,000 units, we must have at our disposal at the beginning of the cycle, a total capital of 1,400 units — the sum of 1,000 units and 400 units. Here the cost of the annual product will be divided into 500 units (for the replacement fund) plus 250 units (for wages) plus 250 units (as the net income).

In the case in question the capital-output ratio would equal 1.4, that is 1,400 units divided by 1,000 units.

Given a greater number of turnovers within the year, the same amount of capital would ensure the output of a far greater volume of production, while the capital-output ratio would go down. Thus, if the number of production cycles were 2, the annual product would equal 2,000 units, while the capital-output ratio would drop to 0.7, or 1,400 units divided by 2,000 units. If there were three production cycles, the annual product would grow to 3,000 units while the capital-output ratio would drop to 0.45, or 1,400 units divided by 3,000 units.

The ratio of fixed to working capital in different industries is not the same throughout. The proportion of working capital is lower in the mining industries and much higher in the manufacturing industries. Generally speaking, it is lower in industries producing the means of production and higher in consumer goods industries. Consequently, the amount of capital required to carry out the production process depends on the pattern of production and the annual number of turnovers. Provided all other factors are equal, the relative amount of capital is smaller, the faster the process of reproduction is carried out. The growth in branches of group I increases the relative amount of fixed capital while the development of the branches of group II increases the relative amount of working capital.

When studying the dynamics of capital we must consider the specific features of the reproduction of its separate components. Working capital is fully consumed within one production cycle and is replaced from the annual product. Furthermore, it also expands at the expense of the annual product. This is secured by increasing the financial resources of enterprises — at the expense of the budget, of the cash accumulations of the enterprises themselves, and of State Bank credits — and by the appropriate material and technical supply. As a rule, fixed capital is replaced and accumulated, in actual fact, at the expense of several years of production. To this end we have capital investments.

Let us now consider the second component of the capital-output ratio. Industrial production is the aggregate of the output of many branches, but in its most general form it may be conceived as the sum of two groups of branches, that is of group A, which mainly produces the means of

* A question for debate.

production, and of group B, which mainly produces consumer commodities.

The interrelation and interdependence of these two subdivisions of social production is based on the operation of the economic law of the preferential development of the production of the means of production and of the other economic laws of socialism. The relationship between the rates of growth in groups I and II depends on the concrete conditions of reproduction. What are the chief factors determining the effect to which the rate of growth in the branches of group I is more rapid? In the process of reproduction group I must guarantee:

(a) replacement of the means of production consumed by output in both groups;

(b) expansion of existing capital as conditioned by the country's domestic requirements and technical progress;

(c) satisfaction of the requirements of other socialist countries in accordance with plans for the coordination of economic development; and

(d) the building up of state material reserves.

Group II must ensure:

(a) the attained level of per capita consumption with due consideration for population increase in the plan period;

(b) a rise in the well-being of the working people of the country; and

(c) an increase in consumer goods stocks.

In determining the extent to which the well-being of the population should be raised, the points of departure are both the prospects for achieving a scientifically substantiated rational level of consumption of key material goods (food, clothing, housing, etc.) and the available and possible resources for the manufacture of consumer goods. Then, the extent to which current and long-range reserves are to be increased must be determined. In the simplest of cases, when exports and imports of consumer goods are equal, the volume of production that society requires in group II may be computed as the sum of the volume of consumption in both subdivisions of social production and in the non-productive sphere and the amount of consumer goods to be accumulated.

When we have steady technical progress and a growth in labor productivity, the share of the necessary product in the value of output drops. However, proceeding from the requirements of the basic economic law of socialism, socialist society ensures a steady rise in the working people's living standards by turning a considerable part of net income into an additional fund for consumption. This is done differently, depending on the concrete conditions of socialist economic development (by cutting retail prices and charges, increasing the average wage, improving pensions, and so on). But the rate of increase in the working people's real income cannot as a rule exceed the rates of increase in output or else the objective basis for socialist accumulation would be undermined. Therefore, in a long-range plan we may proceed from some decrease in the share of wages (though the incomes of the working people will show an absolute increase) in the value of the social product.

The consumption fund in each subdivision of social production is the product of the number of workers and the amount of the necessary product in the given period multiplied by coefficient of the increase in wages. At the same time the rate of increase in the number of workers depends on the relationship between the rate of increase in output and the rate of increase in labor productivity. Hence, the rate of increase in the consumption fund in each subdivision may be determined by the formula: the rate of increase in output multiplied by the rate of increase in wages divided by the rate of increase in the productivity of labor.

Another part of the consumption fund is intended for people working in the non-productive sphere and the members of their families. When considering, in his "Critique of the Gotha Program," the foundations on which the distribution of the social product in socialist society should rest, Marx pointed out that the relative amount of funds for meeting the total costs of administration will decrease drastically, while the product destined for the satisfaction of the joint requirements of all of society (education, science, public health, etc.) will simultaneously increase.

The Communist Party and the Soviet government are pursuing a consistent policy of making the machinery of state and economic administration cheaper and simpler and of reducing the number of administrative employees. At the same time the number of workers in the fields of education, public health, art and science is increasing, and, moreover, the proportion of these workers is rising.

There is no question that the number of employees occupied in the machinery of state and economic management will continue to decline both relatively and absolutely. As for workers employed in the fields of public health, education, and so on, though they will steadily grow in absolute numbers, the rate of this growth will diminish, because the number of workers in education and public health depends directly on the number of working people they service. After the best possible ratio between the number of people serviced and the number of appropriate specialists is reached, the latter (per 1,000 or 10,000 of population) will remain relatively stable, and in working out plans for a long period, we may presume that their appropriate share in the over-all consumption fund will remain stable. Here we have in mind the fund required for the maintenance of workers engaged in the non-productive sphere and the members of their families and not the total outlays of material goods which society distributes through institutions of the non-productive sphere. The material outlays to erect and furnish houses, schools, sanatoria, theatres and institutes, as well as the expenses society incurs to maintain pensioners, guard the public health and care for mothers and child welfare, will unquestionably increase as social production and the national income grow. This is a key requisite for a steady rise in the welfare of the broad masses.

To ascertain the total volume of production and the rate of growth in subdivision II, we need data on the share of each subdivision in the number of people working and in the total incomes of the population during the given period and the projected development of the branches of subdivision I and the non-productive sphere.

Suppose we have the following data for the total social product (see table on following page).

Proceeding from these data we obtain the following indices (in per cent of the base volume):

The consumption fund of subdivision I is: 62 for the given period and $\frac{170}{150} \times \frac{140}{160} \times 62 = 98$ for the plan period;

The consumption fund of the non-productive sphere is: 14 for the given period and $14 \times \frac{130}{100} = 18$ for the plan period;

The consumption fund of subdivision II is: 19 for the given period and $\frac{19}{(62+14)} \times \frac{130}{140} (98 + 18) = 27$ for the plan period;

The accumulation fund is: $5 \times \frac{95}{100-5} = 5$ for the given period and $5 \times \frac{143}{100-5} = 8$ for the plan period;

The total output of subdivision II is 100 (62+14+19+5) for the given period and 151 (98+18+27+8) for the plan period.

Hence, when output in subdivision I increases by 70%, output in subdivision II should, in the given case, increase by 51%.

It should be noted that in order to determine the scale of

	Relative share in given period: in %			Targets for plan period in %		
	Number working	Realized incomes	Use of product of subdivision II	Growth in output	Growth in labor productivity	Rise in living standards
Subdivision I	60	65	62	+70	+50	+40
Subdivision II	30	20	19	to be determined	+40	+30
Non-productive sphere	10	15	14	none	none	+30
Accumulation of consumer goods	-	-	5	same proportion remains		

accumulation of means of consumption, one must proceed from the relationships that have actually developed in previous years in the utilization of the output of subdivision II, taking into consideration the changes in the country's population and, especially, the number of workers employed in social production.

We dealt above with indices of subdivisions I and II as a whole for social production. In calculating the indices for the development of subdivisions I and II in industry and changes in their relationships it is necessary to calculate several additional structural indices, to wit: the relative share of workers engaged in the different branches of the economy in the consumption of the industrial output produced by subdivision II, the percentage of wages to the total of actually used incomes, the share of the industrial output produced by subdivision II in the total consumption fund, etc. But while they complicate the calculation, all these additional structural indices do not change the actual character of the calculation.

We have considered several questions involved in the ratio between capital and industrial output. The published statistics unfortunately do not contain data on the dynamics of all capital in industry. Therefore, the capital-output ratio may only be computed as the ratio between fixed capital in industry and industrial output.

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Years	Industrial capital in per cent of			Gross output of industry in percent of			Capital-output ratio in percent of		
	1932	1940	1950	1932	1940	1950	1932	1940	1950
1932	100	—	—	100	—	—	100	—	—
1937	221	—	—	220	—	—	100	—	—
1938	248	—	—	246	—	—	100.8	—	—
1939	282	—	—	286	—	—	99.9	—	—
1940	321	100	—	319	100	—	100.6	100	—
1945	315	98	—	293	92	—	107.5	106.5	—
1946	335	104	—	245	77	—	136.8	135.1	—
1947	363	113	—	298	93	—	121.8	121.5	—
1948	403	125	—	376	118	—	107.2	105.9	—
1949	446	139	—	451	141	—	98.9	99.9	—
1950	494	154	100	553	173	100	89.4	89.1	100
1951	549	171	111	644	202	117	85.3	84.7	94.9
1952	610	190	124	719	225	131	84.9	84.4	94.7
1953	678	211	137	803	252	145	84.4	83.8	94.5
1954	757	236	153	910	285	165	83.2	82.8	92.7
1955	846	264	171	1023	320	185	82.7	82.5	92.5

This table shows that during the second five-year plan and the three peacetime years of the third five-year plan the capital-output ratio in Soviet industry remained stable. During the war it increased substantially owing to the marked changes in the pattern of industrial production and to the decrease in the volume of production. After the war the capital-output declined steadily. What are further prospects likely to be in this respect?

The operation of the law of the preferential growth in production of the means of production means a steady increase in the share of group A in gross industrial output. This produces an increase in the capital-output ratio in industry because the share of amortization in the costs of production in heavy industries is higher than in the light and food industries. Here are the corresponding figures for 1955. (See table on following page.)

In analyzing the changing tendencies of the capital-output ratio one must also take into account the different periods

	Amortization in % of total production outlays (in 1955 prices)
Heavy industries	
Iron and steel	5.1
Iron and manganese ore	11.8
Coal	6.3
Oil	42.8
Peat	10.1
Natural gas	52.0
Electric power	16.8
Mining-chemical	7.2
Basic chemical	8.5
Engineering	4.1
Cement	9.3
Fire-resistance	6.8
Brick kilns	8.2
Light and food industries	
Cotton textiles	1.1
Woolen textiles	0.5
Linen textiles	0.8
Silk textiles	0.6
Garments	0.2
Leather and shoemaking	0.8
Meat	0.5
Dairy	0.9
Bread	0.6
Alcohol	1.8
Sugar refining	2.9

required to establish operating enterprises in different industries. Practice shows that more time is needed to build an enterprise in the mining industry than in the manufacturing industry, and so on. The longer building time means a greater amount of uncompleted construction. Hence, for every unit of output a relatively larger amount of accumulation is required.

One must bear in mind two very important trends in the reproduction of fixed capital in production. The first is the building up of capital in production and productive capacities at operating projects in economically well-developed areas of the country. At its Plenary Meeting in June, the CC CPSU emphasized that the reconstruction, expansion, and technical reconditioning of existing enterprises is of tremendous economic importance for the successful completion of the seven-year plan. The available stock of buildings and structures in the old areas makes it possible, as a rule, to expand capacities by introducing additional or more efficient equipment, through the rearrangement of shops and equipment, without incurring any substantial expenses for the reconversion of buildings and structures. Again, the building of new projects where communications are well developed is usually cheaper (per unit of newly commissioned capacities) than construction in the new areas which need to be developed. Consequently, it is cheaper per unit of newly created capacity to reproduce fixed capital by expanding the capacity of operating enterprises or building new enterprises in the older economic areas; furthermore, the scale of production can be increased faster thereby.

However, excessive concentration of production in the "old" areas would cause a shortage of resources of power, fuel and raw materials, increase transportation costs, and so on. Therefore, the second key point in the reproduction of fixed capital is to bring production closer to sources of raw material and power and to rationally distribute production throughout the country. All this ensures the solution of major economic-political tasks, the all-round development of all areas, the elimination of remaining vestiges of actual economic inequality between different socialist nations and nationalities, etc. The development of new areas calls for a far greater investment of economic resources and for greater initial outlays per unit of operating capacity. On the other hand, the increased initial investment is more than compensated for relatively quickly.

At different stages of socialist construction the role of the two indicated trends differed. Of exceptional importance today is the task of achieving the optimum combination of technical reconstruction and expansion of existing enterprises with the further development of power and raw material resources in the eastern parts of our country. The resolution adopted by the 21st CPSU Congress points out: "Attention must be paid to the further economic development of the eastern parts of the country which possess vast natural resources. In undertaking a further expansion of capacities, preference should be given to areas where investment would give the maximum economic effect."

The tendency for an increase in the capital-output ratio in industry after the war was more than compensated by an opposite tendency, linked with an increasingly more efficient use of fixed capital, a faster turnover of resources in the national economy, and a substantial economizing of working capital in production.

The building of the material and technical basis for communism is inseparably bound up with a vast amount of new construction in such branches as mining, the chemical industry, the iron and steel industry, non-ferrous metallurgy, the extraction of natural gas and oil, the electric power industry and the production of building materials. These are all industries calling for long-term investments and with high capital-output ratios. Therefore, measures designed to reduce the capital-output ratio in industry and in the national economy as a whole have a special part to play today.

In agriculture production largely depends on natural conditions, though with the growth of agricultural technical and power equipment, this dependence declines. In certain years the expansion of capital in this field need not necessarily be accompanied by any increase in the absolute volume of output. More than that. Output may even decrease, and this decrease may be so marked that it will produce a decline in the absolute growth of the entire social product in comparison with previous years (as occurred, for instance, in 1946, 1954, and 1957). Therefore, a more or less lengthy period of time, three, five, or seven years, should be used in analyzing the capital-output ratio in agricultural production.

Let us further consider the ratio of the national income to the social product. How does this change as social production develop? We know that the ratio of the national income, as the total of the newly created value, to the value transferred from consumed means of production diminishes systematically and regularly when productivity of labor increases, while the share of the national income in the value of the social product drops. But if we take the national income and the social product as the sum of material goods on a country-wide scale, changes in the ratio between them are of a different nature. Because of economies in material resources and changes in the branch structure of material production, the share of the physical volume of the national income in the national product may increase.

Statistical data for the social product and the national income confirm the view that the physical volume of the national income increases faster than the social product. Between 1928 and 1956 the social product increased 13.8 times, whereas the national income increased 15-fold; between 1951 and 1955 the social product increased by 65%, while the national income increased by 71%.

One of the most important relationships in expanded socialist reproduction is the ratio of accumulation to national income. It is determined in the final analysis by the proportions in which the national income is distributed between accumulation and consumption. As for actual accumulation, it depends above all on the structure of social production. To have accumulation, we must have material elements in the form of additional means of production and consumer goods. But when working out plans for the development of production, especially for a more or less lengthy period, a socialist society may change the structure of social production in the required direction and also use foreign trade, foreign credits or state reserves to intensify the growth of consumption or accumulation. The more rapid development of subdivision I, in comparison with subdivision II, makes for a continual growth of accumulation. At the same time this creates the objective conditions for a growth in the share of accumulation in the national income.

The exceedingly high rate of development of subdivision I in the years of the first and, partially, the second five-year plans, required such changes in the structure of utilization of national income that the share of accumulation in the national income grew, while the share of consumption correspondingly decreased. Of course, one must bear in mind here that the decrease in the share of the consumed part of the national income did not imply a decrease in the absolute amount of consumption; on the contrary, this continually grew.

In value or money terms the accumulation fund is part of society's net income produced in different branches of material production. This fund, which is established in the distribution of the national income, may differ to a more or less significant degree from the actually used fund of accumulation. This is connected with the fact that in the process of reproduction we may have various kinds of losses from natural calamities, the abolition of frozen construction jobs, and so on. Further, the created accumulation fund is the condition, the source, of actual accumulation but it is not the same as accumulation itself. So that the accumulation fund becomes actual accumulation and acquires material form, it is necessary that the social product corresponding to this part of newly created value include the material elements of actual accumulation. In practice there may be a disparity between the amount of the accumulation fund in value terms and the possible scale of its conversion into actual accumulation. This happened, for instance, during the years of the first, and, partially, the second five-year plans. The high percentage of the accumulation fund in the national income did not correspond to the material form of the net product, since consumer goods comprised the greater part of the social product. We made good this disparity by intensifying the development of our own engineering industry, and by exporting part of our output, chiefly industrial and agricultural raw materials, in order to exchange it for machinery and equipment.

In recent years the rate of socialist accumulation in the USSR, that is, the ratio of realized accumulation to the national income, is roughly 25%. What are the future prospects of a change in this ratio?

We think there is no reason to expect any essential change in the ratio between the accumulated part of the national income and that used for current consumption. Given a rapid and steady growth in the national income, the established proportions ensure high rates of expanded reproduction and a continuous rise in the population's living standards and the country's national wealth.

The realized accumulation fund consists of several parts which must be distinguished because they differ in character. First, there are additional means of production (fixed and working capital in production), which provide the material basis for the expansion of production, and, secondly, additional resources of means of consumption, required to draw new workers into the process of production, and also in view of the growth in consumption by earlier engaged workers. In combination, these two parts comprise what may be called the fund of expanded reproduction. The pace of expanded socialist reproduction directly depends on the size, structure and dynamics of this fund. A very important problem, therefore, is to establish the extent of natural interconnections between the shares of the fund of expanded reproduction in the total accumulation fund, between changes in the amount of the fund for expanded reproduction and changes in the rate of growth of social production.

One must further bear in mind that the accumulation fund incorporates not only the additional means of production and additional resources of means of consumption. It also includes additional resources of consumer goods for members of society employed in the non-productive sphere and additional means of production (and likewise means of consumption), which society must lay aside as a reserve fund. Statistics of national income show that we set aside 5% to 6% of national income or a fifth to a quarter of the entire accumulation fund as state reserves. The remainder of the accumulation fund is apportioned for the accumulation of production and non-production capital.

The accumulation of production capital includes:

(a) the accumulation of fixed capital in production, which is effected through capital investment;

(b) the accumulation of working capital in production and of circulation capital of production enterprises, which is effected through the enterprises' own cash accumulations, through budgetary financing and bank credits; and

(c) the accumulation of resources of farm products and cattle at agricultural establishments.

The accumulation of non-production capital includes:

(a) the accumulation of fixed non-production capital, which is effected through capital investment:

(b) the accumulation of circulating capital in retail and wholesale trade;

(c) the accumulation of materials in the non-productive sphere; and

(d) the accumulation of consumer resources of farm products in the population's private and subsidiary holdings.

Unfortunately, little statistical data have been published that could be used to analyze the dynamics of the different parts of the accumulation fund. But on the basis of data that are available, we can approximately determine the ratio between the accumulation of production and non-production capital in the total accumulation fund. (1)

We have data on outlays made by the state to increase working capital only for the years of the fifth five-year plan, and therefore we must take all the other known components of accumulation for the same period (see table shown in the upper left-hand column on the following page).

Thus, on the basis of this approximate calculation we may conclude that 70-71% of the total accumulation fund (excluding the accumulation of reserves) went for the accumulation of production capital while 29-30% went for the accumulation of non-production capital during the years of

	Total for 1951-1955	
	In billion rubles	In % of total
Accumulation in production capital:		
(1) Investment by state and cooperative organizations (excluding collective farms) in fixed capital in production	463.1	
(2) Investment by collective farms	66.7	
(3) State-borne investment to increase working capital	66.3	
Total	596.1	70.9
Accumulation in non-production capital:		
(1) Investment by state and cooperative organizations (excluding collective farms) in non-production fixed capital	191.3	
(2) Increase in stocks of commodities in state and cooperative trade in comparable prices (on the following basis):	53.3	
(a) stocks at end of 1950 in prices of corresponding years (96.3)		
(b) index of state retail prices in 1955 (in % of prices at end of 1950) (74.0)		
(c) stocks at end of 1950 in 1955 prices (71.3)		
(d) stocks at end of 1955, in prices of corresponding years (124.6)		
Total	244.6	29.1
Total accumulation	840.7	100.0

the fifth five-year plan.

This ratio is not stable. We can see this from the following data on the dynamics of the growth of fixed capital in the USSR (1928=100):

	1940	1950	1956
Production fixed capital	444	594	1092
Non-production fixed capital	233	258	278

The growth of fixed production capital between 1928 and 1956 was faster than that of fixed non-production capital, but their rates of growth have drawn closer together.

The rates of growth of working capital and inventories are also drawing closer together. We may obtain some notion of this by comparing the rate of growth of industrial output with the rate of increase in the physical volume of trade (see table in upper right-hand corner of this page).

To ascertain the rate of growth of industrial output, it is very important to establish the dynamics of accumulation in industry. To make this problem clear, we may draw upon data for the dynamics of fixed production capital in industry, as compared with the dynamics of the country's

	1940-1957 (1940=100)	1950-1957 (1950=100)
Gross industrial output	389	225
Physical volume of trade	258	234

national income.

These figures make it possible to assert that in 1940-1956 the rate of growth of accumulation in the fixed production capital in industry, in relation to the national income, declined considerably as compared with 1928-1940, and that since the war its share has remained practically stable (as shown in the following table).

	1928-1940	1940-1956	1950-1956
Ratio of rate of growth of fixed production capital in industry and construction to rate of growth of national income	160	96	100

Thus, the economic factors upon which the rate of growth of social production under socialism depends may be determined in exactly the same way as the need for increasing the output of any product. The objectively possible rates of reproduction over a future period may be established on the basis of the following main factors:

(a) the share of national income in the social product;

(b) the share of the accumulation fund in national income;

(c) the share of accumulation of production capital in the accumulation fund (or the share of accumulation in fixed production capital); and

(d) the capital-output ratio (if necessary the capital-output ratio considered in relation to fixed production capital). The quantitative value of these factors is determined on the basis of national economic accounts, with due consideration for possible changes in the indicated factors over the plan period.

Suppose the share of the national income in the social product over the plan period will be 0.5, the share of the accumulation fund in national income will be 0.25, the share of the accumulation of production capital in the total accumulation fund will be 0.8, and the capital-output ratio in social production will be 1.0 (that is, there must be a unit of fixed and working production capital to create a unit of the total social national product); then the possible annual rate of social production over the plan period will be 10%.

To ascertain the rate of development in individual branches of production it is very important that we answer the following questions: How should the share of the given branch in social production change? How should the share of the accumulation of production capital in the given branch change with respect to the entire accumulation fund, or, in other words, what part of the social product will be allocated for the accumulation of production capital in the given branch?

Let us illustrate this by giving an example in which we shall determine the rate of development in industry.

Suppose we have established by analysis that over the plan period the share of national income in the social product will be 50%, the share of accumulation in the national income will be 25%, the share of accumulation in industry will be 45% of the total accumulation fund, the capital-output ratio in industry will be 1, and the share of industry in the social product will be 60%. Then the possible average annual rate of development of industry may be ascertained as follows:

(1) The share of the social product accumulated annually in industry is $\frac{50 \times 25 \times 45}{100 \times 100 \times 100} = 5.625\%$.

(2) The possible average annual rate of industrial development is $\frac{5.625 \times 100}{60 \times 1} = 9.4\%$.

As one can see from the approximate reckoning given here, the rate of development of industrial production, assuming a constant share of the national income is allocated for accumulation in industry, depends directly on the capital-output ratio and on the share of industry in the social product. A decline in the capital-output ratio resulting from technical progress, the more efficient use of fixed production capital, economies in the use of working capital, the faster turnover of this capital, and so on, these all serve to increase the rate of industrial development.

The exceedingly high rates of industrial growth achieved in the USSR during the first and second five-year plans had their objective basis in the marked increase in the share of accumulation in the national income (whereas in 1926-1927 it was 16-17%, in 1932 and 1937 it was 27% and 26% respectively). The following table on the structure of state capital investment provides some idea of how the share of accumulation in industry grew.

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	1st five-year plans	2nd five-year plans	3.5 years of 3rd five-year plan	4th five-year plans	5th five-year plans
Total state investment in production capital	100	100	100	100	100
Investment in industry (as % of total)	56.8	58.5	61.4	69.4	72.2

During the period of comprehensive building of the material and technical base for communism in the USSR it is essential that the highest possible rates of development be achieved in industry and agriculture. It is this that determines the high rate of production accumulation in national income and the corresponding forms of reproduction of fixed capital (reconstruction, modernization of equipment, etc.).

We have analyzed some of the interconnections between the material factors of reproduction. To make possible a balanced determination of the rate of development of social production as a whole and of its various branches, society must also fix and ensure, in a balanced fashion, the corresponding expansion of labor resources and the steady growth of productivity of social labor. The question of increasing labor resources, and, especially, of raising labor productivity is of paramount importance. However, this question goes beyond the limits of this article. We shall, therefore, confine ourselves to only one general remark. In working out a long-term plan there is every reason to believe that the growth of labor productivity, which will be secured both by the increase in labor's technical and power arsenal and by the influences which the higher technical level of the instruments and means of labor will exert in raising the skill and ability of the workers in production, will be a powerful factor not only in maintaining high rates of reproduction but also in further increasing these rates.

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Footnote

(1) We have no data on the actual amounts and dynamics of the production and consumer resources of farm products in collective farms and the population's subsidiary farm holdings, on the head of cattle accumulated and capital investments made by the population or on the extent of amortization and wear and tear of fixed production and non-production capital. Therefore, it is impossible to compute the absolute amount of the accumulation fund as a whole and the accumulation of production and non-production capital. We can only try to determine the ratio between the known components of the accumulation fund, bearing in mind, furthermore, that these are the largest components of accumulation.

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A. Boiarskii:

On "Econometrics" and the Use of Mathematics in Economic Analysis

One of the tasks posed by the Twenty-First Congress of the Communist Party of the Soviet Union is that of overcoming the lag in economics, which should study the laws governing the development of our system and furnish a sound foundation for economic planning and management, for assuring the proportionate development of the economy with the maximum utilization of all its possibilities for accelerating the advance towards communism. To this end economic science should make a deeper study of the operation of the laws of economic development, extending its analysis to both the qualitative aspect of social relations, and to quantitative relationships in the economy. This was the way in which it was founded and developed by Marx, Engels and Lenin. The stage attained by the socialist economy requires further development of theoretical economic analysis, and on this basis, a more thorough investigation of the quantitative relationships in economics, a higher "degree of precision" in economic calculations. It is enough to recall the great absolute results involved in a 1% increase in production or labor productivity, a 1% reduction in production costs, etc., in order to see the need for greater accuracy in the calculations of rates, the relationships between branches of production, comparisons of the efficacy of different variants of capital investments, etc. Hence the increasing application of mathematical methods connected with the use of statistical materials, i.e., with the results of the concrete measurements of magnitudes characterizing the economy. The need to apply mathematics in economic analysis was always recognized by Marxism. In the light of the tasks for improving planning posed by the Twenty-First Congress of the CPSU, the accuracy of economic calculations and, consequently, of mathematical methods of economic analysis, acquires still greater significance. It is therefore necessary to equip economists with deeper knowledge of mathematics and to further the application of mathematics in different spheres of economics. There is no doubt that important headway will soon be made in this direction. It is only necessary that we become well aware of what should and should not be done to achieve this.

What should not be done in the first place is to copy foreign patterns of applying mathematical methods in economics without a thorough critical analysis, although superficially this may seem like the quickest way of achieving rapid success. Mathematics is only a means of quantitative analysis which always has at its basis a definite concept of the nature of the object. Concepts of the nature of economics, as we know, are distinguished by partisanship. This partisanship is also reflected in the methods of quantitative analysis.

This determines our attitude towards the trend in modern bourgeois economics which is known as econometrics. From the linguistic viewpoint no objections can be raised against the term itself: its literal meaning is economic measurement, measurement of economic phenomena, i.e., exactly what we need. However, in science this linguistic approach often leads to misunderstandings and mistakes. Econometrics stands in fact for a very definite school of bourgeois economics which has taken shape in the West, and to define our attitude towards it means to appraise the trend of this school rather than translate into the Russian language the meaning of the elements composing this word. What matters is not the composition of the word but the development of the trend it denotes.

Although the term "econometrics" has been in use for a comparatively short period of time (it was proposed by Frisch in 1926), its representatives themselves are constantly emphasizing the continuity of their work with that of Cournot, Jevons and Walras. The latter, more than anyone else, is presented in the role of chief apostle. This alone is indicative of the close connection between econometrics and the subjective school of bourgeois political economy with its theory of marginal utility. This connection may be clearly seen in the history and source of this school and in the nature of the work of the econometricians. The vulgar economist was never interested in the real essence of economic relations. On the contrary, it has always been his task to present them in a distorted apologetical light. As for the practical tasks before him, they have always been and are confined within fetishistic limits. Chief among these is invariably the question of supply and demand and the establishment of prices resulting from their inter-play. Attempts to solve this question, without going into the essence of economic relationships, have been made in varying ways by most bourgeois economists. They do not venture below the surface of phenomena, nor is this required of them. What remains is the juggling with methods of mathematical analysis, and this is what we have been observing throughout the history of econometrics, including its 19th-century predecessors. The development of all the component parts of modern econometrics may be traced back to the basic problem, the problem of the equilibrium of supply and demand in exchange. Had we undertaken to define it, we would have had to say that econometrics is a bourgeois school of economics which applies mathematical and statistical methods in the effort to solve the problem of equilibrium of supply and demand, mainly on the basis of marginal utility theory.

In the works of econometricians one finds to this day many repetitions of Cournot's elementary problem of the equilibrium of supply and demand of a commodity viewed as a function of its price, though it may be done with the use of statistical materials and with complications in the form of the so-called "cobweb theorem" (which treats of the consecutive approximation to the point of equilibrium, i.e., to the price equivalent at the point of intersection between the declining demand curve and the rising supply curve). (1) True, in isolated form, without considering changes in incomes, prices of other commodities, etc., the problem becomes quite detached from reality. Hence the chase after special cases and data, as, for example, changes in postal

exchanges in the case of a sudden change in rates, etc. But such isolated changes of one factor are rare. A quantitative analysis of demand would of necessity have to view it not only in connection with the price of a given commodity, but also with prices of other goods and with the total incomes of buyers. This has produced an extensive series of demand studies, so called "demand analysis," which is generally recognized as the main component of econometrics and which is based on the ideas of the marginal utility theory.

Here we find different variants of the "mathematical model" of the supply and demand equilibrium.

The typical reasoning in the theory is approximately as follows (see Pareto, Edgeworth and others). The Homo Economicus estimates the aggregate amount of utilities, in which the first item is included in the amount X_1, the second in the amount X_2, etc., of a certain monotonously growing function $F(X_1, X_2...)$. The successive item of the i utility acquired (yielded) he appraises by the corresponding increment (or diminution) of this function, i.e., its partial derivative $F'i$. Taking into consideration the prices p_1 and the possible total expenditure D, this individual will be distributing his purchases so as to maximize F in the case of $\Sigma x_i p_i = D$. Reducing the partial derivatives $F - \lambda D$ we have $F_i : p_i = \lambda$, i.e., with an increase of 1 ruble in the amount spent on the purchase of any utility, the "total satisfaction" of F rises by the same amount. As for the nature of the F function itself, it is presented in full conformity with the marginal utility theory. As we know, the latter is directed against the Marxist concept of labor as the source and criterion of all wealth. As for the mathematical aspect of the matter, thus far we have had no proof either of the existence of the F function as an objective criterion which is common to the totality of homo economici, nor the transitive value of the aggregate utilities (i.e., if "utility A is greater than B" and "B is greater than C," then it always follows that "A is greater than C").(2)

The same principle of marginal utility is also transferred to labor power. The result is that profit is given a rather peculiar apologetic explanation (J. B. Clark and others): it becomes an expression not of the social relationship between the average productivity of all workers and the marginal productivity of the last worker to which the wage corresponds. In price analysis the decisive role is also played not by the social relationship between the seller and the buyer, but by the quantitative relationship between the stocks of utilities available to them. It is clear that this theory must inevitably be cloaked in mathematical form, although it does not in the least follow therefrom that any economic reasoning presented in mathematical form must be connected with this theory.

In the practical aspect of the problem of demand, econometrics abounds in statistical investigations and many of these are unquestionably interesting. Undoubtedly, the most important figure in this division of econometrics is Wold. (3)

The specific measure of "elasticity" frequently employed in these investigations is understood as the relationship between percentage changes in two magnitudes, demand and prices, for example, etc. Nevertheless, even in these practical investigations the influence of the same marginal utility theory may be seen at every step.

The connection between the measuring apparatus and concepts of the nature of a phenomenon may be well illustrated by the example of the measure of "elasticity." The use of one and the same measure for the dependence of production upon both the amount of capital and the number of workers, corresponds to the ratio that value is created not only by labor, but also by the instruments of labor.

This is expressed in the following formula which has become popular in econometrics after the publication of Douglas' work (4):

$$P = cK^aL^{1-a}$$

where P stands for production, K for capital, L for labor and a for the parameter of the elasticity of production in relation to capital, its magnitude being less than 1.

From this there follows the idea of some sort of a just distribution between the capitalist and the worker.

The study of demand leads, on the one hand, to attempts to achieve an over-all solution of the problem for the aggregate of commodities, and on the other hand, to attempt to supplement a statistical by a dynamic treatment.

The former has found expression in V. Leontief's "input-output analysis." (5) The wide range of interests of monopolies and the growth of the elements of state monopoly capitalism stimulated the over-all approach to the treatment of this question. It was not without reason that a powerful impact to the development of this aspect of econometrics was supplied during the Second World War.

There can be no doubt that Leontief has tried to borrow a great deal from the balance sheet studies of Gosplan in the twenties, and, especially, the idea that the volume of output of products used as means of production must have a definite relationship to the volume of production in the branches in which they are consumed. But, unlike our balance accounts which are based on actual patterns of expanded reproduction, Leontief's system is based on the vulgar theoretical and methodological postulates of bourgeois political economy.

In reality, Leontief's system has its source in the system of equations of Walras and Cassel. In particular, wages and profits cannot be distinguished from each other in Leontief's system. Consumption is fixed in advance in the form of definite amounts of means of consumption per unit of labor supplied by "households" which figure in this system as one of the economic branches along with industry, agriculture, etc. On the whole, Leontief's entire system represents a variant of the bourgeois theory of equilibrium which ignores the contradictions of the capitalist economy.

True, it should be noted that Leontief's "input-output" analysis is not limited to a simple system of equations which express a so-called static problem. More important is the second, more complex system of equations which expresses the dynamic problem and covers rates of production growth in all branches. But it is precisely here that the theoretical flaws and the purely practical weaknesses of the entire construction are most evident. Securing rapid growth allegedly gives rise to a definite demand for various articles at the time of this growth. But the whole essence of the question here lies in the fact that a gap in time is inevitable between the investment of resources and the growth of output, and any theory of balances which claims to be of any practical value must somehow cope with this.

As we know, the capitalist economy is subject to cyclical fluctuations. The problem of demand therefore leads to investigations of the business cycle, which makes up a large division of econometrics. But here we find a number of sharp political problems, inasmuch as this cycle vividly reflects the inability of capitalism to cope with the use of the growing productive forces. Here, therefore, the investigations of econometricians reflect most directly the general apologetic trend of the entire school. Mathematics is used to construct numerous and varied theories of the cycle, but they do not disclose its real causes, which lie in the contradiction between the social character of production and the

private character of appropriation.

In the thirties the theory of quasi-periodic fluctuations in stochastic processes was very popular among econometricians. This theory, originated by the Soviet mathematician E. E. Slutsky, is an important scientific achievement, as may well be seen by its numerous uses in cybernetics, in the theory of inter-dependence and other fields. Its essence is briefly as follows: the combination of inter-connected accidental fluctuations may lead to the formation of waves which outwardly are not distinguished from the behavior of series based on strictly periodical functions. Although this is a purely mathematical theory which does not contain any elements relating to economics, the apologists of capitalism used it as a pretext for interpreting periodic crises of overproduction as a simple result of the correlation dependence between economic elements, between their present and past quantitative characteristics. It is to theoretical constructions of this kind which have lately been nurtured by Keynesian ideas, that Fischer, Vinci, Tinbergen and other econometricians have tried to tie the statistical study of the cycle. Many works are dedicated at the same time (by Fischer and Divisia) to the construction of indices, this problem being solved on purely formal grounds.

A dynamic treatment of the question of equilibrium in exchange has led in the postwar years to the appearance of a new division of econometrics, the theory of games. The role of the latter is appraised so highly that it is precisely the economic studies connected with it that some authors are especially inclined to denote by the significant term "mathematical economics." (6)

The formal difficulty encountered by the dynamic treatment of the old problem of equilibrium in exchange is as follows. Demand, and together with it, the price, are not constant factors. Should the sellers hold back their goods in anticipation of higher prices, and the buyers hasten to make their purchases, then, according to the theory of equilibrium of supply and demand, the price will rise at once; it will drop again later. Forseeing this, the sellers and purchasers should act contrary to it; but then the price must really rise later. The result is a vicious circle, and the way out of it was promised by von Neumann's theory of games.

No sonner had its author made a slight hint in the note to his article in 1928 about card games, etc., that the same considerations lie behind the acts of the Homo Economicus, than this theory was taken up by the Austrian-American economist O. Morgenstern. A voluminous work was published jointly by J. von Neumann and O. Morgenstern under the pretentious title of "Theory of Games and Economic Behavior." (7) Here we already find the assertion that the theory of games means as much to economics as geometry to physics, etc.

The reason for the rapid penetration of the theory of games into econometrics lies, however, in that it has not only encouraged the hope that it would supply the missing link in the theory of equilibrium in exchange, but also in that it has opened new possibilities for the apologetic interpretation of all economic questions in general which are closely linked to the theories of "people's capitalism," etc.

In the light of this theory, the individual attempts to achieve success on the basis of three factors: firstly, information about the rules of the game and possible enemy strategy; secondly, correct choice of strategy, and, thirdly, luck in "chance moves." Victory comes to the most skilled, talented and lucky players. The theory of games demonstrates mathematically no more and no less that it is an advantage to all the players to find themselves in a position where the majority must lose in order that a few lucky ones should grab a big stake! Equal right to gains and equal right to poverty — that in essence is the meaning of this peculiar version of the theory of "democratic capitalism." True, in order to substantiate these ideas it is necessary to carry through a thorough reconstruction of the marginal utility theory and of some ideas about the shapes of utility curves. But the reward is "mathematical proof" that inequality raises the average standard of living.

Given corresponding arbitrary assumptions (with regard to the nature of dependence of satisfaction from income received upon its magnitude), it appears that the total satisfaction is greater when incomes are distributed unevenly. Naturally, the mathematical theory of games itself, whose specific uses may be of certain value, is not responsible for this apologetic usage. It is perfectly obvious that the treatment of the theory of games as a key to the understanding of economic processes is apologetic in character.

Rules of concrete games are absent in the abstract theory of games mentioned here. It covers everything at once: bridge, chess, football and social life. Chess players, however, have their own theory which is based on the rules of the game. As for social life, those who favor treating it on the basis of the general theory of games are trying to reduce it completely to the latter. The result is a theory of society without social relations, i.e., the very object of bourgeois apologetics.

So-called linear programming is also considered at times as a component of econometrics. The only ground for this lies in the fact that it is closely associated with the theory of games along mathematical lines. In both cases it is a question of solving the problem of finding the minimum or maximum (marginal) linear function, given some restricting conditions. But linear programming is used, for example, in solving the problem of how to distribute among consumers an identical output of producers so as to reduce to the minimum the total amount of haulages in ton-kilometers. Linear programming of itself is in general only a method of solving a definite type of mathematical problem, and to consider it a part of econometrics only on the grounds that it is used in the solution of certain related problems is impossible, just as it is impossible to consider the table of logarithms, which is also used by econometricians, as part of econometrics.

Econometrics exhibits a definite unity which does not stem from the outward similarity of the related investigations, the abundance of mathematical formulas, graphs and statistics. The unity of econometrics has far deeper ground in the logical interdependence of its parts. We have seen that this interdependence is determined by the general idea of investigation of the problems of equilibrium in exchange.

Of course, econometricians themselves assign a much broader definition to their science, and there is nothing surprising about this. However, they emphasize that "econometrics is not economic statistics, not an economic theory, not the application of mathematics to economics," that "only the unification of all these three elements" (i.e., political economy, mathematics and statistics) creates this new entity, "econometrics," as is stated in the editors' declaration in the first issue of the magazine "Econometrica," (8) issued by the International Econometric Society. Here we have unambiguous reference to a synthesis in which on the surface political economy occupies the place of one of three equal ingredients, so to say, but which in reality is intended to become a substitute for political economy and thus rid economic science of its "domination." It is not difficult to guess that the purpose of all this talk about such a synthesis, about a new science of "econometrics," which is a substitute for political economy, is to do away altogether with a truly scientific investigation of social relations and

o replace it completely by an investigation of the quantitative relations of the surface of capitalist economy, to reduce the matter entirely to a formal mathematical analysis of the relationships between supply and demand and of exchange proportions (prices).

Marxism has always attached great importance to mathematical methods in economic calculations. It is enough to recall the study of simple and expanded reproduction in the works of Marx and Lenin, Marx's investigations of the relationships between the rate of surplus value and the composition of capital, of which Marx himself wrote that at first it (the investigation) moves in the purely mathematical sphere, Marx's treatment of the question of investigating the curves of economic development, etc. As for statistics, Marxist-Leninist science abounds in brilliant examples of its use for the solution of highly important economic problems. V. I. Lenin's works of genius represent an unsurpassed example of statistical analysis in world science.

Hitherto this was called economic statistics and under this name it has been developing and can develop in the future. We see no grounds for any talk about "Soviet econometrics"; at best this is a chase after some flowery new word (which for three decades has already had behind it a very old apologetic content).

The opinion one sometimes comes across in foreign literature that a process of "deapologization" of bourgeois economic science is allegedly taking place, as expressed in the studies of econometricians, is also wrong. In order to see that the contrary is the case in reality, that the apologetics of capitalism are becoming more pronounced, and that this is so in the works of the econometricians in particular, it is enough to cite statements made at the Paris conference on econometrics in 1952, where the capitalist system was praised for affording the possibility of playing various fascinating "games," with the resulting enrichment of some through the exploitation and impoverishment of others. It may also be enough to recall Leontief's system which investigates the structure of the American economy but from which the figure of the capitalist is missing altogether.

In this connection one cannot but mention the following misunderstanding. Attempts are made to represent econometrics as a harmless means of using electronic computers for economic calculations. Both formally and in essence econometrics had taken full shape long before the appearance of the first electronic machine. These machines find application in it just as they are used in any other field where a considerable volume of calculations is required, which would otherwise be extremely difficult or even practically impossible.

In fact, examples of the use of electronic machines for solving econometric problems are quite rare in the voluminous literature on econometrics.

True, without these machines it would have been difficult to solve complex problems of linear programming, or the "input-output analysis" equations. But machines do not settle theoretical problems. They do not create an economic school. Their use in economic calculations has no relation whatever to econometrics, because they can be used in econometrics and they may also be used for calculations based on diametrically opposed principles of economic theory. Therefore, we cannot agree with those comrades who speak of the introduction of econometrics when they have in mind the use of modern computing machines for economic calculations.

Attempts to draw an analogy between econometrics and cybernetics are equally out of place. There can be no analogy between the school of political economy which rests on the anti-Marxist theoretical principles of marginal utility theory and a system of machines which are not associated with any theory, with any world outlook. This analogy can only weaken our critical alertness with regard to econometrics and undermine a correct estimate of it. It is hardly necessary to note that an identification of econometrics with the use of electronic machines for economic calculations, which is a distortion of the truth, could merely make this incorrect analogy appear appropriate to the uninitiated person.

From the above it should be clear that a critical attitude towards econometrics should not interfere in the least with a positive development of precise quantitative analysis in economics and with the use of the latest computing machines in this field. More than that. The greater the development of this precise analysis, the more important is a critical appraisal of econometrics, without which there may be an indiscriminate transfer to our own circumstances of some elements of econometrics, and this could merely discredit and thus retard the development of the use of mathematical methods in economics. Of course, the general criticism of econometrics as a school does not exclude the use of some of the rational elements found in the works of econometricians, as for example, the application of linear equations for analyzing balance connections, etc. On the contrary, a critical estimate makes it possible to use them without the danger of dragging in the incorrect concepts of this school.

It is often argued that while rejecting the ideology of the econometric school, we should use its mathematical apparatus. In general, this thesis is correct with the exception of the one little word "its." As we have already seen, the marginal utility theory uses the rule of finding a relative maximum of the function of many variables. But this rule is not in the least a part of econometrics; it is part of the differential calculus. It is in textbooks on differential calculus and not in compositions on econometrics that one should look for all the information on this question.

We have already mentioned the use of linear programming for the solution of some problems. It would, however, be no less a mistake than the identification of econometrics with electronic computing, to view linear programming as a component of econometrics. In reality it is a method of solving a definite problem of finding the extreme of a linear function, which is used in economic calculations and in calculations for technical projects of road construction, in agro-technical and other fields. The fact that an achievement in any field of science and engineering should have and does have an economic effect does not yet lend an economic character to any problem in this field. Viewed from this angle, it was the result of a misunderstanding that the problem of finding the optimal variance of splitting iron sheet, which was solved successfully before the war by the Soviet mathematician V. L. Kantorovich, was viewed as part of economic science. We have not picked this problem at random inasmuch as the methods for its solution, calculated to produce a definite economic result, belong precisely to linear programming.

Of great significance in Leontief's system mentioned above is the use of matrix calculations. The latter should assist in the solution of a number of economic calculation problems. Of course, what we have in mind is least of all the fashionable renaming of any table as a "matrix"; this would not be of any help at all. What we have in mind is the use of relationships established in the matrix calculation for revealing the conclusions arising from the given table, its properties, etc. It would, however, be absurd to place matrix calculations in econometrics and to look to it for information about the properties of the characteristic

magnitudes of matrixes rather than to the aporopriate course in algebra.

What is most important about econometrics is not its mathematical scheme but its application. Consequently what makes econometrics is not the mathematical apparatus but a definite economic interpretation of a definite economic problem. That is why econometric formulas must not be treated as phenomena that are as objective and impartial as the multiplication tables. Therefore, we may perhaps use and will be using, in an accurate analysis of quantitative relations in economics, some similar mathematical calculations and statistical methods, but this will be the use of mathematics or statistics, and not of econometrics; moreover, this must be done on the basis and in development of Marxist political economy and not in order to substitute for it some kind of "mathematical economics."

There is no doubt that Soviet economic science will achieve great success in perfecting this analysis. It has no need for "learning from" econometrics in order to do this. It has a sound foundation in Marxist teachings, possibilities for the rapid practical implementation of the achievements of science and engineering in the planned economy of the world's first socialist state, and, lastly, the brilliant successes of Soviet mathematics.

National economic planning based on the conscious use of the requirements of objective economic laws presupposes, of course, the need for a concrete (including mathematical) analysis of the processes at work in the economy. Large-scale accounting and analytical work connected with economic management presupposes the extensive use of mathematical methods of investigation. Thus, the processing of the returns of only two major statistical operations of this year, the population census and the re-evaluation of fixed assets, presents quite a number of analytical problems. Complex calculations will be necessary for appraising the efficacy of capital investments, finding optimum variants for capital investments, for the distribution and size of enterprises, for cooperation and specialization, inter-district communications and transportation plans, etc. With the growing improvement of services for the population (transport, communications, trade, etc.) and for production (electric power, repairs, etc.), there will be an increasing need for accurate calculations of their organization based on the theory of probability. Questions relating to the material balances alone provide a vast field for the application of mathematical analysis based on deep knowledge and use of economic laws. Soviet national economic planning has accumulated a great deal of experience in the treatment of planning balances, the scientific importance of which can hardly be overestimated. It would be wrong to assume that any "econometric" models could be used here. Like all other planned balances, material balances are worked out on the sound basis of Marxist-Leninist economic theory. It would be a waste of time to try to develop a system of balances without considering the economic content of matters at hand, without determining the relationships between the consumption and accumulation funds, the relationships between subdivisions I and II connected with them, etc. And for this reason a thorough study of the general scheme of expanded socialist reproduction which reflects the economic aspect of the question is necessary before the question can be analyzed in its technological aspect by means of a system of linear equations and matrixes.

It will be remembered that with regard to the schemes of reproduction Marx clearly indicated the role of mathematical methods in economic investigations. But what Marx had used merely for illustrating the laws governing the process of reproduction and exchange between subdivisions, we are using as a basis for calculating the national economic plan and balances. Hence the need for a detailed analysis of quantitative relationships in expanded reproduction. It is no accident, therefore, that a number of authors (9) have turned to a mathematical analysis of the reproduction schemes. True, thus far this question has been analyzed in their works for successive finite time intervals. Important results may also be obtained by treating the question in the spirit of an analysis of infinitesimals, having in mind the continuity of the process. Let us illustrate this by the example of certain deductions.

If P denotes the flow of products (with sub-indices for the subdivisions), R — the net product and C — means of production advanced, then in the time element dt the consumption fund Rdt-dC should equal the production of subdivision II, P_2dt, i.e.,

$$P_2 = R - C'. \qquad (1)$$

Rdt-dC includes not only current consumption, but also accumulation of stocks and reserves of articles of consumption.

Introducing relative magnitudes: the share 1 in production $H = P_1 : P$; the share of the carried-over value $s = c:P$ and the magnitude of production capital per unit of output ("capital-output ratio") $S = C:P$, we shall find that $C' = (SP)' = SP' + s'P$, and our equation is transformed into $(1-H)P' = (1-s)P - SP' - S'P$.

From this we easily derive the following for the rate of growth of production (in the analytical sense):

$$k = \frac{P'}{P} = \frac{H-s}{S} - \frac{S'}{S} \qquad (2)$$

The rate of growth equals the difference between the ratio of the excess of the share of subdivision I over the share of the carried-over value, on the one hand, and the "capital-output ratio" and rate of growth of the "capital-output ratio" on the other hand. This relationship indicates that the rate k depends upon H, s, S and the rapidity of change in the "capital-output" ratio S'. With the latter as the given magnitude, the rate of growth may be raised only by raising the share H of subdivision I.

As for the distribution of the increase dP in $dP_1 + dP_2$, then, assuming identical rates for the subdivisions $dP_1 = HdP$, i.e., the growth in subdivision I would be equal to the product of multiplying its share in the total product by the general increase in the total product. But the predominant growth of subdivision I, which is a law of expanded reproduction, means that instead of this

$$dP_1 = (H + a)dP = Hdp + adP,$$

where a stands for a certain function of time $a(t) > O$, which could have been called a coefficient of the predominant growth of subdivision I. But

$$dP_1 = d(HP) = PdH + HdP.$$

Consequently, $PdH = adP$ and, dividing by Pdt, we have

$$H' = ak. \qquad (3)$$

It follows that the rate of growth of the share of subdivision I in the total product is equal to the product of the general rate of production growth multiplied by the coefficient of the predominant growth of subdivision I. From this it is easy to derive the rates for the subdivisions:

$$k_1 = \frac{P'_1}{P} = \frac{(HP)'}{HP} = \frac{H'}{H} + \frac{P'}{P} = \frac{ak+k}{H} = \frac{a+H}{H} k$$

And similarly:

$$k_2 = (1 - \frac{a}{1 - H})k.$$

This result is easily analyzed, in particular for constant a, s and S. Then the differentiation (with H' found above taken into account) gives us

$$k'_2 \quad \frac{ak}{S} \left[1 - a \frac{1 - s}{(1 - H)^2} \right].$$

Leaving aside $k \leq 0$ (simple and limited reproduction), we note that with $a \leq 0$ the difference in brackets is positive, and, consequently, $k_2 \leq 0$. The maintenance of, and still more an increase in, the rates of growth in subdivision II makes it absolutely essential to surpass the rates of growth in subdivision I which should correspond at least to

$$a = \frac{(1 - H)^2}{1 - s} \qquad (4)$$

— a conclusion the importance of which is well known but which hitherto has not had mathematical expression.

In reality a, s and S are, of course, variable magnitudes. For planning purposes, however, it may be assumed that s and S change because in the future growth of production these relationships will be different than they were at the initial moment of the planning period. In that case we may obtain:

$$k = k_0 + \frac{ay - (s_1 - s_0) \quad (1 - \frac{1}{J})}{S_1} \qquad (5)$$

where 0 stands for the initial moment, 1 for corresponding relationships for the growth of production, J for the index of production in relation to the initial moment (10), y for its logarithm. By differentiation we obtain the following:

$$k' = \frac{}{S_1} \left[\frac{a - s_1 - s_0}{J} \right], \qquad (6)$$

and consequently, in order to maintain the planned rate it is necessary that

$$a = \frac{s_1 - s_0}{J}, \qquad (7)$$

i.e., the coefficient of the predominant growth of subdivision I must at least equal to the ratio of the difference between the new and initial share of the carried-over value to the index of production.

Let us assume, for example, that the planned annual rate for the seven-year period, i.e., for the entire period of the plan, is 10%, which represents a doubling (J = 2). Let us assume further that the share of the carried-over value in the increase of production is greater than at the initial moment by 5%, i.e., by 0.05. At the initial moment J equals 1, and consequently a equals 0.05, and at the end of the period a equals 0.05 divided by 2, equals 0.925. If at the initial moment the share of subdivision I was, for example, 0.7, then the corresponding rates for the subdivisions should be, at the beginning of the period, 10.7% and 8.3%, and at the end — 10.3% and 9.3%.

Thus, mathematical analysis enables us to disclose more fully the rich contents of the schemes for expanded reproduction. And this is only one, although in our opinion the most fundamental, of many tasks requiring the use of mathematical methods in economic research and planning. It is necessary to promote the extensive use of mathematical methods in working out the basic problems of the political economy of socialism and national economic planning on the basis of the unshakeable principles of Marxist-Leninist economic theory.

Wider use of mathematical methods of economic analysis will help to further improve the methodology of national economic planning, and especially the balance accounting of planning organizations, in particular by developing balances of relationships between various branches of production. This work should be conducted not on the basis of the notorious econometrics, which is merely one of the latest expressions of bourgeois apologetics, but on the basis of a scientific generalization of the colossal experience of working out plans and plan balances accumulated in our country which contributes to the development of economic science. This experience shows that only on the basis of Marxist-Leninist science, which now also includes the science of national economic planning, can genuine scientific results be achieved through the use of mathematical methods in economic analysis.

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(1) Cf., for example, M. Ezekiel, "The Cobweb Theorem," Quarterly Journal of Economics 58, 1938, or R. G. D. Allen, Mathematical Economics, London, 1957, 1.

(2) In an interesting work published in the volume Problems of Economics, Planning and Statistics, Moscow, 1957, A. A. Konius, trying to prove the expediency of prices conforming to values, accepts the existence of this function. But in that case the value should have been calculated per unit of change in F, i.e., it would be determined not by labor, but by utility. Evidently, in this section the author's reasoning requires serious corrections.

(3) See H. O. A. Wold and L. Jureen, Demand Analysis, Wiley, 1953.

(4) Douglas, The Theory of Wages, Chicago, 1936.

(5) V. V. Leontief, Investigation of the Structure of the American Economy, Gosstatizdat, Moscow, 1958.

(6) It is to be regretted that this term has also been adopted here by the Referativny Zhurnal po Matematike (Mathematical Survey Journal), which, incidentally, has rendered a valuable service by its information about corresponding books and articles. Without reducing this information, the editors of this extremely useful publication could have refrained from the use of a term which is unambigously counterposed to the term "political economy."

(7) J. von Neumann and O. Morgenstern, Theory of Games and Economic Behavior, Princeton, 1957.

(8) Econometrica, Vol. 1, 1933, "Editors' Note."

(9) An example is V. N. Starovsky's "An Experiment in the Mathematical Interpretation of the Schemes of Expanded Reproduction" in the magazine The Socialist Economy, Books 5-6, 1928.

(10) The introduction of this index follows from the examination of the system of differential equations (2), (3) and the equations for S' and s' which may be obtained on the basis of our assumption.

(Sotsialisticheskii Trud — Socialist Labor — No. 5, 1959)

S. Figurnov:

Principal Forms of Increasing Real Wages in the USSR

In a socialist economy, the most important result of a continuous rise in labor productivity and in the production of the society is that the real income of the workers systematically increases. Between 1940 and 1958, the real income of the workers and employees of our country has more or less doubled, and at the present time is many times higher than it was in 1913. A further substantial rise in the real income of the workers is being planned for the seven-year period that has just started. The control figures for the development of the national economy of the USSR during 1959-1965 call for an average 40% increase in the real income of the individual worker. The realization of this goal will help to raise the prosperity level of our people to a height inaccessible to capitalism.

The substantial rise in the real income of workers and employees contemplated during the current seven-year period will be accomplished first and foremost by further increases in their real wages. Under socialism, wages have been and will long remain the principal manner in which the comforts of life are distributed in the state-owned sector of the economy. This will be accompanied by still further increases in other real income components: pensions, allowances, free education and medical care, family aid through the organization of child education and other supplementary revenues from public funds over and beyond wages. The increase in the workers' and employees' wage fund to about half again as much will raise the total volume of state outlays for these purposes by about 70% during the seven-year period.

As for real wages themselves, they will be increased over the next seven years chiefly by enlarging the cash earnings of workers and employees, with concomitant price reductions in the public food service system. This decision has not been adopted by accident. In its selection of ways by which to increase real wage earnings, the Communist Party and the Soviet government base themselves on scientifically sound principles, taking account of specific character of each stage in the development of the socialist economy. This procedure makes it possible to determine each time the best possible combination of wage increases and price cuts, and the correct utilization of both forms in planned management practice in the socialist economy.

The Objective Basis for the Combination of Monetary Wage Increases and Price Reductions

The real wages of workers and employees in the USSR are increased mainly in two ways: by outright increases in money wages and by cuts in the state retail prices of consumer goods. Real wages will also be increased by the forthcoming abolition of tax payments, a reduction in the rates for paid services, a lowering of kolkhoz market prices and so forth, but these factors will be of comparatively minor importance.

Increasing real wages by reducing consumer goods prices affects simultaneously all the workers and employees who purchase these goods, while maintaining existing wage relationships. The kolkhozniki and other segments of the population will also gain along with the workers and employees from the reduction of state retail prices, particularly of industrial products. A price reduction, however, being chiefly a means of generally increasing the real income of the workers, offers no broad possibilities for accomplishing this increase in ways suited to each individual group of workers and employees. Monetary wage increments, on the other hand, are usually employed for selective, rather than for over-all real wage increases. In the hands of the state, monetary wage earnings are a convenient and versatile means for the introduction of necessary changes in wage relationships.

It follows from this that monetary wage increments and price reductions are by no means equivalent ways of increasing real wages and they differ in their effects. Objects attained by the one cannot be attained by the other and vice versa. Hence, they are both usually applied together, mutually complementing each other, but in varying combinations.

When determining each time the requisite proportion to be attained between the monetary wage growth and the reduction of prices, the socialist state bases itself on a quite specific objective principle which follows from the requirements of the economic laws of socialism. If large-scale socialist reproduction is to develop normally, it is necessary that the rate of increase of monetary wages be pegged to the rate of growth of labor productivity. And it is most important to take account of the factors that make for the improvement of labor productivity. If product output is increased chiefly through factors that raise the quantity and quality of the human element in labor (labor intensity and worker skill), then, according to the law of socialist distribution in accordance with work done, the wages of workers who increase the product output should be raised; the rise in wage earnings can then come more closely to approximate the growth in production output. This makes it possible to secure the personal material involvement of the workers in the results of their labor, thereby contributing to an over-all rise in socialist production.

It is another matter when production output increases are brought about, not by quantitatively and qualitatively increasing the labor input, but with current labor inputs and through technological advances, which increase the productivity of human labor. The effect of such a rise in labor productivity is improperly claimed as the achievement of individual workers and collectives, although their cash wage earnings may be raised as a stimulus to the introduction of new techniques. This effort is the achievement of all the people and should belong to the society as a whole. In the process of large-scale socialist reproduction, when the productivity of labor is increased by providing it with improved means of production, the labor productivity increase outstrips the rate at which wage earnings increase. Thus, after compensating for the material inputs and allowing, to the

extent necessary, for an increase in socialist accumulation, a considerable portion of the savings achieved can be put into a general expansion of popular consumption by enlarging public service funds and reducing prices, and also by raising the workers' wages, not necessarily, however, in those shops where the savings were achieved, but in other shops and enterprises, where such raises are needed.

In accordance with the law of value, which operates under socialism on the basis of a special kind of commodity production, state retail prices on consumer goods should reflect the level of labor productivity and of the social costs of production. As labor productivity goes up and social production costs go down, the unit commodity cost decreases, which, in turn, makes possible corresponding price reductions.

When determining the rate at which wages are to be raised and the extent to which prices are to be cut, cognizance must also be taken of the requirements of the law of the planned, proportional development of the national economy, which at one time or another may make important corrective adjustments in the correlation between the various means employed to raise real wages. In particular, when what is wanted is to raise the real wages of low-income workers and employees and to narrow the gap between maximum and minimum earnings, the line to be followed should be that of raising the money wages of workers in this category. The gap between maximum and minimum earnings cannot be narrowed by a general price cut, however, because this offers greater advantages (in an absolute sense) to better-paid workers. The average scale of purchases made by high and middle-income workers and employees is always greater than that of purchases in low-income groups. Hence, if the purchasing power of all the various groups in the population is increased by an identical percentage throughout by uniformly reducing the prices of all commodities, the purchasing power of the low-income groups suffers the lowest absolute increase of all.

The situation is altered somewhat when, instead of an over-all reduction in prices, a selective reduction is applied to the prices of a restricted range of commodities. It is known, for example, that families with equal incomes, but with unequal numbers of minor children, find themselves in different circumstances. A reduction of prices of children's goods would have the effect of increasing the living standard mainly of not very well-to-do families. The same applies to price reductions of plain furniture, work clothes and footwear, of vegetables, public food service products, etc. But even this kind of selective price reduction cannot ensure a radical solution to the problem of raising the living standard of less prosperous groups of workers. Calculations have shown that it is almost impossible to effect a price reduction in practice which would benefit only the less prosperous groups.

In this manner, a multitude of circumstances converge in different ways at different stages in the development of the socialist economy to make the combination of ways by which to raise real wages an extremely mutable and variable affair. In some cases real wages are increased to a greater extent by raising money earnings, and in other cases by reducing prices. There is no room here for an outline of the pattern; everything depends on the concrete conditions under which the rise in real wages takes place. It is particularly important in this connection to make provision in national economic plans for the most rational possible combination of ways to increase real wages in each period and for the most suitable rate at which to raise money wage earnings and to lower prices.

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The Relationship Between the Rise in Money Wages and the Drop in Prices Between 1946 and 1958

During the postwar period of the development of the national economy of the USSR, the relationship between the price level and the level of workers' and employees' money earnings has changed three times. Up to 1947, real wages, which had gone down during the war years, were raised entirely by increasing money earnings at a time when state retail prices were high. From 1947 to 1954, real wages were predominantly raised by means of mass price reductions accompanied by a moderate rise in money earnings. Finally, real wages are being increased further at the present time chiefly through a rise in money earnings. This is brought out by the following figures (in percentages of 1940):

	1947	1954	1956
Real wages of all workers and employees in the national economy (as computed by the Central Statistical Administration of the USSR)	50-60*	174	182
Average money earnings throughout the national economy	172	210	219
Purchasing power of the ruble (the inverse of the price index)	30-35*	83	83
General price index of goods and services (as computed by the CSA USSR)	300-350*	121	120
State retail prices	321	138	138
Kolkhoz market prices	372	107	98

* Estimates of the writer.

The first postwar years (1946-1947) were a period of transition for the country to a peacetime economy, in which the main objective was to repair the damages of the war. The conditions under which the movement of real wages proceeded were marked by extremely limited stocks of consumer goods, a continuance of regulated state rationing of such goods side by side with commercial trading at high prices, intensified market excesses on the unregulated market, the presence of large cash surpluses in circulation and their partial depreciation. In September, 1946, to pave the way for derationing, the prices of rationed goods (they had remained till then at the low prewar level) were brought more closely into line with commercial prices. Under these conditions, it naturally became evident that money wage earnings would have to rise rapidly. In connection with a slight increase in state retail prices on the regulated market, all workers and employees earning up to 900 rubles received an increment to their wages of 80-110 rubles a month. At about the same time, a 20% increase in wages and salaries was awarded to hundreds of thousands of workers and of engineering-technical personnel in charge of branches of industry and construction in the regions of the Urals, Siberia and the Far East. Altogether, the average level of money earnings of workers and employees in the country rose in 1946-1947 by one-third and in 1947 was 72%, and for industrial personnel 86% higher than before the war.

During the following seven-year period (1948-1954),

which began with the currency reform and the abolition of the ration-card system in December, 1947, real wages went up many times as a result of the general reductions of consumer goods prices carried thorugh each year in state and cooperative trade. During the period referred to, state retail prices were reduced by 56%, including foodstuffs by 62% and industrial goods by 47%. This reduction afforded the population savings running into the hundreds of millions of rubles. In addition, kolkhoz market prices went down by about 75% between 1947 and 1949. During the course of ten years starting with 1947, and counting state and kolkhoz price reductions, the general commodity price index fell by about 60%. In capitalist countries during the same period, the average level of consumer prices rose, according to official figures: in the USA by 25%, in England by 61%, in France by 270%, in the Federal German Republic by 32%, in Italy by 37% and in Japan by 290%. The mass price reductions carried through in state and coporative trade in the period preceding the XXth Congress of the CPSU outstripped the actual magnitude of reductions effected in the value and unit costs of production, in connection with which the rising rate of money earnings was slowed down. Between 1947 and 1954, the average money earnings of industrial workers and employees rose by 22%, and throughout the national economy as a whole by 20%, while real wages as a whole roughly tripled. The rise in the average level of money earnings in the country was influenced to a certain extent by shifts in the composition of the total number of workers and employees brought about by a preponderant increase in the number of workers in leading and, consequently, in highly paid branches — in industry and construction, and in branches of heavy industry. Money earnings were raised, to a considerable extent, by pulling up the wage level in the light and food industries. The rise in average money earnings was effected to a certain degree through such constituent components as rewards for prolonged meritorious service, allowances for work in the North, additional payments in application of territorial coefficients and so forth. At the same time, remuneration components directly connected with the growth of labor productivity have not contributed sufficiently to increasing average wages, as a result of which the material incentive of the workers to raise labor productivity has suffered.

On the other hand, the price cuts effected at that time also failed to live up to expectations. Even though the policy of reducing the prices of goods of mass and daily consumption, especially foodstuffs, as pursued in the course of the general price decline, did afford a certain advantage to low income groups, yet the well-to-do groups remained the chief beneficiaries from falling prices. Besides, being poorly related to the actual decline in product values and unit costs, the general price reduction gave rise to partial imbalance in price formations and entailed a heightened demand for certain commodities and, in a series of cases, their irrational consumption.

The preferential reduction during 1948-1954 of the list prices of commodities in highest demand by no means meant that they always actually fell, since many of the commodities quoted low on pricelists were then produced by industry in insufficient volumes. The relative unavailability of quality goods at accessible prices drove the low income groups to buy, in their stead, more costly commodities, thereby subjecting their budgets to unnecessary strain.

All these shortcomings confirm in practice the impossibility of solving all the problems involved in increasing the real wages of the workers exclusively through price reductions and without due attention to raising money wage earnings.

On the basis of resolutions of the XXth Congress of the CPSU, important measures were adopted which secured a sharp upswing in the rate of growth of money earnings which, since 1955, has been the most important channel for increasing the real wages of workers and employees. Money earnings are now rising at a rate which is much more fully consistent than before with the rate at which labor productivity is rising, which has made it possible to make better use of the powerful lever of personal material incentives in the development of production. Whereas in 1951-1953 the money earnings of industrial workers rose at an average yearly rate of 1.6%, in 1956-1958 this rate was stepped up to 3.6%, i.e., it more than doubled, each percentage of labor productivity growth corresponding to an increase in average wages of 0.5% against 0.2% at the start of the fifth five-year plan.

The work done to adjust the over-all national economic wage system, especially the increase by one third of the wages of low income workers and employees made effective on January 1, 1957, helped substantially to secure the rise of cash earnings.

As regards price reductions, possibilities have been limited in recent years by the top-priority necessity for a solution of problems of such vital importance to the population as the improvement of workers' pension provisions and the augmenting of the wages of low income workers and employees. It should also be considered that, in order to establish a correct balance of prices, to which little attention had been paid while general price reductions were in progress, it had been necessary to carry out limited measures of price alignment, which, in individual cases, amounted to slight boosts of prices that, on certain commodities, had been set too low. Thus, the prices of meat, animal fats, potatoes, vegetables, fruits and several other foodstuffs were, at one time or another, revised. The prices of certain industrial commodities were also subject to change. Particularly, the prices of certain types of automobiles, motorcycles and machine-made carpets were raised. At the same time, the prices of vodka and wines were raised as a contribution to the struggle against excesses in the use of alcoholic beverages.

The discontinuance of over-all price reductions has not hindered the reduction of prices of individual commodities. In 1956 price cuts were put into effect for children's wear and other items in the range of children's goods, staple fabrics, aluminum wares and radio equipment; in 1957 price reductions were proclaimed on medications, time-pieces, canned fish and vegetables, food concentrates, lard, pork, smoked preserves and a few other products. The reductions in the prices of these commodities resulted in savings of about 5 billion rubles per year and fully compensated for partial increases in the prices of certain commodities. In 1958, the unit prices of bakery products were rounded off, mostly downward, the prices of individual types of television sets and cameras were decreased, the prices of herring and sprats were cut, the prices of jams and marmelades dropped, and new reductions were made in the prices of some children's goods.

The fundamental modifications in the movement of cash wage earnings and of the consumer price level that will accompany the elimination of their existing defects will provide the basis for a more effective utilization of the ways of raising real wages during the course of fulfillment of the seven-year plan for the development of the national economy of the USSR during 1959-1965.

The Relationship Between the Rise of Money Earnings and the Fall of Prices in the Seven-Year Plan

It has been established by the planning figures for the

development of the national economy of the USSR during 1959-1965 that the rise of the real wages of workers and employees in the coming years will be accounted for mainly by increases in their money earnings and to a lesser extent by price reductions. While real wages will go up roughly by one third altogether, and all real incomes of workers and employees (computed per worker) by 40%, average money earnings throughout the national economy will rise by 26% between 1959 and 1965. This is associated first of all with the need to adjust wages and raise them for low and middle income workers and employees, i.e., with the implementation of such measures as will fundamentally alter the existing wage balance, which cannot be accomplished by means of price reductions.

While providing for an uninterruptedly rising level of prosperity for all members of the society, the Communist Party and the Soviet government are undertaking top-priority steps in order, as rapidly and as radically as possible, to improve the position of workers whose standard of material security is inadequate. To this end, in continuation of the rise in the wages of low income workers and employees begun in 1957, a further substantial increase in minimum wages is contemplated between 1959 and 1965, to be accomplished in two stages. During the first stage (1959-1962) minimum wages will be gradually increased throughout all sectors of the national economy to 400-450 rubles per month. During the second stage (1963-1965) it is intended gradually to increase the minimum wages of workers and employees by a further 100-150 rubles per month, i.e., to raise them from 400-450 rubles to 500-600 rubles per month, with a limited increase to the wages and salaries of middle income workers and employees. Thus, while money earnings throughout the national economy will experience an over-all average rise of 26%, minimum wages will go up 70-80% as a result and the gap between maximum and minimum earnings will thereby be narrowed.

As part of the planned development of the national economy of the USSR, the socialist state always maintains the wage balance in a flexible state, adapting it each time to the objects to be attained in each given period. During the industrialization years, a time of acute skilled manpower shortage, the wages of trained workers and employees skyrocketed. At the time this contributed to a quick solution of the problem of cadres for socialist industry, then under construction. But now that the cadre problem has been largely solved and the bulk of the working class is attaining a high level of culture and technological know-how, there is no need to retain the earlier wide gap between maximum and minimum wage levels. On the contrary, if the standard of living of the lower income worker categories is to be raised, the existing gap will have to be narrowed by means of the selectively accelerated increases in the wages of low and middle income workers and employees.

As contemplated in the Control Figures of the Seven-Year Plan, the first stage in the augmentation of the wages of low-income workers and employees will be associated with and based on the concurrent completion of the gradual adjustment, begun in recent years, of all wages throughout the national economy. The main purpose of adjusting wages by production branches is, by raising pay rates and instituting new rate scales, by increasing the relative importance of the basic rate as a constituent of earnings, by the wide introduction of technically sound output norms and economically effective wage systems, to intensify the material involvement of the workers in the results of their labor and, thereby, to secure a further rise in labor productivity and national prosperity.

During the course of the wage adjustment, the multitude of uncoordinated and discrepant pay rates will be replaced by unified pay rates within each branch of production, which will be drawn up with due regard for the contribution of the branch to the national economy and for the conditions under which its workers perform their labor. At the same time, the range of pay scales will be sharply curtailed: instead of the existing 7-, 8- and 10-category pay scales, 6-category scales will be, as a rule, introduced, with a high-to-low category ratio of 1:2 in the machine-building and several other branches of heavy industry, and with a similar ratio of 1:1.8 in the light and food industries. As regards engineering and technical personnel, it is intended to reduce the difference between highest and lowest pay through a schedule of official rates, and to eliminate excesses in bonuses to managerial personnel.

The measures put into effect throughout the national economy to adjust the wage system and improve it further also provide for radical shifts in the wage level balance between branches, regions and workers' occupational specializations. With a view to the establishment of a more correct balance among the wages of workers in different occupations, the pay of the most highly skilled and trained engineers and shop foremen employed directly in production will be raised first of all. Designing specialists and technologists working on the improvement of production techniques and technology will be placed in a preferential position. Along with the adjustment of wages and increasing them for low and middle income workers and employees, the seven-year plan provides that the current increase in wages resulting directly from increased labor productivity will be maintained, keeping pace with, for example, improvements in the use by workers of their working time and with the advancement of the worker's occupational training.

The rise in the money earnings of workers and employees due to increased labor productivity will reflect, in particular, important shifts in the average level of training of the workers. The cultural-technical level of the working class will rise even further during the new seven-year period. Young people with secondary educations will move in great numbers to factories, mills, construction sites. Many workers will improve their qualifications and will study in evening schools, technical schools and at institutes. In keeping with the reorganization of the popular education system, our secondary schools and colleges will be genuinely tied in with production, which will enhance the occupational training standards among the bulk of the workers even more. The cultural-technical level of the more unskilled workers will undergo an exceptional rise.

It is known that the generally high cultural-technical level of the overwhelming majority of workers in individual areas of production has been accompanied by the continued survival of relatively unproductive and unskilled forms of labor that have been extremely ineffective in yielding a useful return to society. This is true most of all of various types of auxiliary jobs, performed either manually or with obsolete techniques and equipment, and also of several obsolescent occupations in unproductive branches of the national economy. These jobs and occupations correspond to the lowest wage rates paid. The goal now is to free production from the less productive forms of labor once and for all. The important measures charted in the seven-year plan for the thorough mechanization of production processes in all branches of the national economy, including the light and food industries and agriculture, will result in the switch-over of considerable numbers of workers and employees from less productive and low-paid labor to more productive and better-paid jobs. The same effect will be

achieved through the mechanization of operations and improvement of the skills of workers in unproductive branches.

These are, by and large, the chief circumstances that will make possible the augmentation of real wages during the next seven years predominantly through increased money earnings. It is for this reason, as well as because of the forthcoming increases to minimum pensions, that the possibilities of price reductions are, to a certain extent, limited. "It hardly serves any purpose," Comrade N. S. Khrushchev has said, "to carry out a general reduction in prices in the way this was done a few years ago, when the chief beneficiaries from such a reduction were mainly the high-income workers. It will be more correct to use the corresponding funds to raise the cash wages of low- and middle-income worker categories, and also to boost minimum pensions."*

The comparatively minor scale on which recourse will be had to price reductions during the next seven years does not stem from any lack of appropriate objective pre-conditions in the areas of labor productivity and social value (on the contrary, the impending rise in labor productivity will be increasingly achieved through factors affecting the reduction of commodity costs), but exclusively from the specific character of the present stage, connected with the accomplishment of tasks involved in raising the standard of living of less well-to-do groups of workers. Over the next few years, however, price reductions will continue, if on a limited scale. The price reduction policy worked out by the Central Committee of the CPSU provides for reductions in the prices of public food service products, which will substantially extend the circle of users of the service. This, in turn, will have a beneficial effect on the worker's family budget and will ease the labor of millions of housekeeping women. In addition, reductions will be made in the prices of certain other commodities, mainly to meet the need for an adjustment of and elimination of discrepancies in prices.

At the current stage of economic development, considerable supplementary reductions could be effected in consumer prices, especially on foodstuffs, by increasing labor productivity and cutting production costs in agriculture. Indicating the ways by which farm production is to be further increased, the December (1958) Plenum of the Central Committee of the CPSU gave every kolkhoz and sovkhoz the job of obtaining as high a production yield as possible from their assigned lands, to exercise prudence in the management of their affairs, judiciously exploiting every advantage. There is no other way for us to ensure that farm prices will be brought steadily down and the prosperity of the people improved further.

Independently of changes in the list prices of individual commodities, immense additional untapped potential for reduction in the prices of all the mass of industrial commodities acquired by the workers could be exploited by changing the composition of popular consumption itself. From the standpoint of the prospects for developing industrial commodity consumption, the effects of two tendencies should be borne in mind. The first of these consists in the fact that the rising prosperity of the Soviet people is accompanied by an expanded sale to the public of more costly commodities, whose consumption is contingent on a certain measure of availability. This process yields benefit only to the extent that it reflects the growing needs of the Soviet people. The other tendency consists in the necessity to expand by every possible means the production and sale above all of low-cost goods, in which the low-income and less prosperous strata of the population are mainly interested. We are not talking here about low-quality "substitutes," but about fully high-quality products, with basically the same consumer characteristics as are offered by expensive products. The resolutions "On Increasing the Production, Expanding the Variety and Improving the Quality of Children's Apparel and Footwear" and "On Increasing the Production of Furniture for Sale to the Population," adopted in 1958, are of fundamental importance in this connection. These resolutions particularly set forth measures to expand the output of cheaper forms of the commodities indicated so as to render them fully accessible to every family.

The extensive use in light industry of artificial and synthetic materials, which require much less processing labor than natural materials, offers especially promising possibilities for reducing the prices of manufactures intended for the consumer market. That is, too, why it is so much less costly to manufacture from synthetic rather than from the usual materials. As a result of the accelerated development of the chemical industry, the public will be adequately supplied with good-quality goods at inexpensive prices, which will unquestionably play a quite considerable part in raising the real wage level.

Skillfully combining the rise in money earnings with price reductions, the socialist state is ensuring, in a planned manner, a steady rise in the real wage earnings of the workers and employees of the USSR.

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* Pravda, November 15, 1958.

(Planovoye Khozyaistvo — Planned Economy — No, 7, 1959)

M. Diachkov:

Methodological Questions of Revaluing Fixed Capital

Fixed assets constitute a most important component of the social wealth of a country. The share of fixed assets in the social wealth of the USSR grows from year to year. This reflects the economic might of the country, the growing technical equipment of industry and other branches of the national economy, the growing satisfaction of the multifarious social demands and the constantly rising cultural and everyday requirements of the population.

The growth of fixed assets and the change in their composition and qualitative structure are directly related to the scale and rates of capital investments, and the categories and technical characteristics of the production capacities and construction projects being put into operation.

A correct accounting of fixed assets on a nation-wide scale is of special importance in view of their role in the economic life of the country. The recording of fixed assets in the country as a whole as well as in the individual republics, economic administrative areas, economic councils and ministries, must meet certain conditions. First of all, the indexes covered by this accounting are required for national economic planning of reproduction of fixed assets. This requires a knowledge not only of the total volume and value of all fixed assets but also of their structure by industries, their subdivision into branches and categories, the efficacy with which they are used and the length of service under different operating conditions. All of these data are necessary for the solution of a wide range of planned tasks. Thus, when determining the volume of capital investments, their structure and use, it is necessary to know the efficiency with which available machinery and its production capacity is being used.

On the other hand, the data on the condition of the various kinds of fixed assets in operation and the length of their service make it possible to compute, on a sound basis, the volume of new capital investments required to restore existing capacities and to determine what new equipment, machines and other means of production have to be produced for this purpose.

A correct accounting of fixed assets is of enormous significance in the management and direction of an enterprise, in the strengthening and development of cost accounting. Without information on the volume and structure of fixed assets, their distribution, condition, percentage of capacity employed, wear and tear and repairs, it is difficult to manage an enterprise under conditions when the role of fixed assets in the process of production is steadily growing.

Indexes of an accounting of fixed assets at industrial enterprises are necessary, in particular, for a correct solution of all the most important questions of financial planning and cost accounting as a whole. Data are required here for both the value of the worn-out part of fixed assets as an element of production costs, and for the sum of amortization as a source of partial or complete restoration of the value of fixed assets.

All this emphasizes the importance of correctly organizing the accounting of fixed assets, based upon general uniform methodological principles of assessing their value.

Preparations for a reassessment of fixed assets as of January 1, 1960 are under way in accordance with a government decision.

This reassessment, as distinct from previous ones, covers the fixed assets of the national economy as a whole rather than that of the individual industries, districts or departments. This is the first time that the reassessment of fixed assets is being carried out in the country on such a scale, and it is of major economic importance. It will determine the volume, structure and technical condition of fixed assets of our enterprises in current prices at full and residual value. The same data will serve for a comparative description of the technical equipment of individual factories, branches of industry and the national economy as a whole, the extent of their equipment with power and mechanical facilities, the degree to which the capacity of their plant and building space is used, i.e., to study the efficiency with which machinery and the various forms of fixed assets operate.

The reassessment has another aim too, namely to help strengthen cost accounting at our enterprises. By revealing the real value of all the fixed assets and eliminating the disparity in their assessment it will be possible to define amortization charges with a higher degree of accuracy and, therefore, the cost of goods produced.

There are numerous instances of entirely unjustified differences in the evaluation of similar pieces of equipment and other fixed assets even within one and the same factory, which only serves to underline the importance of the task undertaken. A reassessment is also needed because the value of fixed assets is steadily growing, leading to an increase in the total amount of amortization and, under certain conditions, in its share in the costs of production. At the same time the fluctuations in the value of identical elements of fixed assets, depending upon the time of their acquisition of construction, is so great as to distort the costs of production in some instances by overestimating amortization in certain cases and underestimating it in others. Shortcomings in the assessment of fixed assets also lead to errors in financing plant repairs. Since the source of financing capital repairs of fixed assets is their amortization, the amortization allowances will be too low if the assessment of fixed assets is set at too low a level, inasmuch as these allowances are based on an established percentage of the cost of fixed assets. In some industries, in which the rift between present prices and those in which the fixed assets were originally calculated is particularly wide, there is a shortage of funds for capital repairs, while the actual amortization of fixed assets is inadequately reckoned in production costs.

The connection between the reassessment and these questions is obvious, if only because it will cover those fixed assets (state, public and cooperative organizations) for which amortization sums are set aside. This means that the fixed assets of budgeted organizations will remain outside this reassessment.

Simultaneously with the reassessment it is also necessary to determine the wear and tear of fixed assets; it is assumed that the reassessment will be followed by a

revision of existing norms of amortization charges. New amortization charges, differentiated by various types of fixed assets, are to be submitted for approval by the government by August 1, 1960. The new charges are to be differentiated by the intensity with which they are employed and the frequency with which they are changed, with a view to ensuring the renewal and overhauling of fixed assets, obsolescence also being taken into account.

The revision of the amortization charges, like the reassessment of fixed assets, should result in better cost accounting on the part of the industrial, agricultural, trade, transport and other establishments, better use of the fixed assets at their disposal and improved organization of repairs, and provision for complete renewal of the value of fixed assets in the course of their fixed term of service.

About half a million enterprises and organizations will be involved in the reassessment of fixed assets. The success of this big and complex operation will depend in no small degree upon efficient organization and a correct choice of methodological principles.

The general organizational principle guiding the reassessment of fixed assets is that it must be carried out by enterprises themselves in accord with basic methodological directions. The state statistical bodies will exercise control over the completeness and quality of the reassessment data and will process, summarize and analyze the materials received. The economic councils, ministries and other government bodies also will be charged with certain functions connected with the reassessment. Each of them will directly control the reassessment at their enterprises and organizations, check up on the data received from them, summarize and submit them to the state statistical organizations. The general economic bodies, industrial and territorial, will thus form an important link in the reassessment work as a whole.

The reassessment work will be divided into several stages. The evaluation of fixed assets in the new prices must be preceded by a check of the assets in kind. It will be necessary to determine the composition and location of the assets, verify their specification data, the date of their acquisition, their capacities, etc.

This information can be obtained in large measure from data drawn from current accounts of fixed assets. It must be stressed, however, that these accounts often suffer from serious shortcomings and therefore cannot always be sufficiently relied upon.

One of the most typical defects of the current accounts of fixed assets is the unsatisfactory condition of the technical documentation, such as lack of technical specifications of equipment and floor plans of buildings. Even at the big factories where the records are adequately kept only a part of the equipment is covered by specifications, usually the lesser part. In other cases large heterogeneous pieces of equipment of different value and use are grouped together instead of being accounted individually. There are also cases of machinery being reckoned together with the building, or of articles of small value and short duration being included among fixed assets instead of among current assets, in accordance with accepted procedure.

An inventory of fixed assets can help eliminate existing flaws in their accounting provided it is carried out in accordance with prescribed rules. The inventory should show fixed assets as described at the time of their inspection and measurement in kind. Where the taking of inventory is replaced by copying of existing accounts (cases of this kind are on record), the reassessment of fixed assets, naturally, will not provide accurate and verified data on the available fixed assets of the enterprise. It is not by chance therefore that so much significance is attached to the yearly inventory of fixed assets in the entire reassessment work.

While an inventory of fixed assets is conducted annually, in 1959 it must be taken advantage of more efficiently, and in addition to its usual aspects, it should consider the tasks posed by the reassessment of fixed assets. The basic aim of the inventory is to provide a complete account of all fixed assets and technical documents, to eliminate the inaccuracies and flaws existing in these documents, and carefully to fill out inventory cards for all fixed assets. It is only on this basis that fixed assets can be correctly combined by major groups and technical and production uses, i.e., be classified according to definite characteristics, defined by the existing system of national economic planning and recording of fixed assets and adopted for the reassessment.

Flaws in the accounting and inventory of fixed assets may also seriously hamper the reassessment work because in the solution of all the most important methodological questions the multifarious structure of fixed assets cannot but be taken into account. The normative data used to recalculate the value of fixed assets vary with the particular characteristics of the different groups of fixed assets; the determination of their wear and tear also requires a varied approach, etc.

The reassessment of all fixed assets must be made on the basis of their present value. This is a general rule. But as far as equipment is concerned, as distinct from buildings and structures, obsolescence of design must be taken into account.

The reassessment of buildings and structures must be made on the basis of consolidated indexes, while the reassessment of equipment, machinery and rolling stock must be based upon the prices given in the wholesale price lists plus the cost of shipment, assembly and installation.

The reassessment requires normative documentation of two kinds: price lists of equipment, machines and rolling stock on the one hand, and handbooks of consolidated indexes for evaluating building objects — buildings and structures, on the other.

Equipment, machines and rolling stock are classified in the price lists by certain groups, such as casting, forging, textile groups, etc., their nomenclature not being limited to what is being produced at present, but including many articles of obsolete as well as imported equipment. The type and trademark of each item of equipment are given together with a brief technical description and the full (restoration) value in current prices. This value includes the purchase price as well as shipping, storage and assembly charges. For obsolete, imported and non-standard equipment which is not included in the price lists the restoration value is calculated by the enterprises themselves directly on the spot. This operation presupposes the existence of a uniform method of calculation, based upon a definite formula. According to this formula, the restoration value of obsolete equipment is equal to the restoration value of modern equipment of home manufacture divided by the ratio of the productivity (or capacity) of the modern piece of equipment to the productivity (or capacity) of the obsolete piece of equipment. This formula may be expressed as follows:

$$R_2 = \frac{R_1 \times P_2}{P_1}$$

where R_2 is the restoration value of the obsolete item,
R_1 is the restoration value of the modern item of home manufacture,
P_2 is the productivity of the obsolete item,
P_1 is the productivity of the modern item of home manufacture.

This is a simple form of calculation. It lends itself to extensive practical use whenever the present value of obsolete or other equipment not included in the price lists has to be determined. The methodological consistency of this form of calculation cannot be denied, because in it the price is invariably dependent upon one and the same basic index, the productivity or capacity of the given piece of equipment. There may be exceptions, of course. They apply to the means of transport, for instance. In the case of water transport, the main indexes accepted are the operating properties of the vessel and the cost of maintaining a ton of carrying capacity. This is a combined calculation, which never has to be made in practice, however, because there are not very many types of vessels in existence and their restoration value is fully given in the price lists.

The price lists as normative documents are distinguished by the fact that they are all based upon current purchase prices of equipment, machines and means of transportation. The same procedure could not be followed in compiling consolidated indexes of the value of buildings and structures because the latter do not lend themselves as readily to standardization and typification as do industrial products. The method of reducing the various types of equipment listed among fixed assets of enterprises to their typical representatives is an auxiliary method limited only to obsolete and, to some extent, to imported equipment. For buildings and structures, on the contrary, it is virtually the only practicable method. This explains why a different type of normative handbook had to be applied in this case, so-called consolidated indexes of value instead of price lists. In drawing up this document it was impossible to use as a basis the wholesale price lists as the main source of information to determine the present value of the fixed assets. No such prices of buildings and structures exist. Their value is determined by the estimates drawn up for each object separately. These are individual calculations made in different years and in different prices. The number of such estimates apparently approximates the number of building units in existence. Under these conditions the best solution seems to be to use averages based upon a preliminary selection and calculation of the cost of buildings and structures, both of a productive and non-productive character, most typical of our day.

Such normative documents are embodied in catalogues of consolidated indexes of the cost of buildings and structures. They present information on unit costs, i.e., the cost of a square, cubic or linear meter of this or that object.

The enterprises undergoing reassessment can readily use these catalogues to determine the new, restoration value of their fixed assets. All that is necessary is to have verified figures on the volume, area or length of each object covered by the reassessment. Before proceeding with these calculations, however, it is necessary to establish the category to which the building or structure subject to reassessment belongs or just which consolidated indexes are applicable in the reassessment. Of course, the concrete description of the objects cited in the consolidated indexes may not fully coincide with that of the object undergoing reassessment. What is to be done in this case? We shall illustrate it by an example. Handbook No. 11 entitled "Consolidated Indexes of Value of Buildings and Structures in the Meat Industry" gives values of refrigerators. Two types of refrigerators, a one-story and a multi-story type, have been accepted for the purpose. Each has its own definite technical characteristics. The handbook presents prices for one-story refrigerators which have the following basic features: foundation — rubblestone or rubble-concrete, walls — concrete, columns and ceilings — reinforced concrete, roof — paper, floors — asphalt, cement or tile, insulation — mineral cork, finishing materials — improved.

The one-story refrigerator actually being reassessed may have different walls or ceilings, a different floor or an iron roof, but this does not mean that the assessment requires any correction. The technical solutions may differ but the choice of design, the arrangement and the planning of any building intended for production purposes are quite limited. Everything depends in the long run upon the functional role assigned to it in the production process. The volume and height (number of stories) of a building affect the choice of a technical solution in a far greater degree. This was reflected in the consolidated indexes handbooks. In particular, the cost of a cubic meter of a building, including refrigerators, is differentiated both with regard to the number of stories and the volume.

Within certain limits the increase in the volume of a building, whether of one or many stories, leads to a reduction of unit costs. This tendency was not ignored in the compilation of the normative data. Thus, for a refrigerator of up to 5,000 cubic meters in volume the unit cost (per cubic meter) amounts to 142 rubles, whereas for a volume of 30,000 cubic meters and up the unit cost is 115 rubles. This applies to one-story refrigerators. The fluctuation of the unit cost of many-storied refrigerators depending on their volume is also quite considerable: from 128 rubles per cubic meter for a volume of 30,000 cubic meters and less to 100 rubles per cubic meter for a volume of 70,000 cubic meters and up.

The catalogues give more differentiated prices for residential buildings than for industrial buildings. In the former case consideration is given not only to the volume and number of stories but also to the wall material and the various amenities. This wider combination of indexes is matched by a larger variety of technical characteristics, in conformity with which uniform prices are fixed for dwellings of different types. But here too, as in the evaluation of industrial buildings, the individual distinctions of construction and layout or architectural features of each concrete object are not accounted for.

The point is that the correction for obsolescence of design, i.e., obsolescence in its second form, does not arise in the case of building objects. This task arises only when reassessing the value of machines and equipment, and this is quite natural. If, for instance, the safety factor of some old building exceeds the modern technical requirements, this does not necessitate any correction in its assessment. The assumption is that the given object suits its purpose in the same measure as other objects of similar use and functioning under similar conditions.

But there may be other kinds of objects, of a unique character, which do not lend themselves to comparison with any of the typical versions provided for in the handbooks. It would be difficult in such cases of course to use these normative materials. It is not impossible therefore that for such objects as an underground railway, skyscrapers, etc., the reassessment would have to be carried out in some other way. In this case the calculation could be based upon the estimates used to build the said objects corrected by a coefficient for changes in the prices used in the estimates. It is assumed that these coefficients, as average relative quantities, are worked out by the ministries, departments and economic councils themselves.

The index method of recomputation of estimated building costs is well known in the practice of accounting and planning. It is used whenever there are changes in price levels in building operations. This practice, which is of long standing, could be used to compute average coefficients,

which will apparently be taken in many cases as a basis for the forthcoming computations involved in the reassessment of fixed assets. But here a different kind of question arises too. The estimates, as a document reflecting the value of the object undergoing reassessment, are not always reliable. Numerous instances are on record when the estimated cost could not be established because the estimate itself did not exist. This applies particularly to enterprises located on territories which were occupied by the enemy. But while no estimates may be found there, the data of the reassessment carried out in 1945 should be available. Under such conditions it would probably be best to use the 1945 data instead of estimates. This method may apparently be applied to any object reckoned in the prices of some definite year.

The current restoration value of such objects may always be determined with the aid of average coefficients of price fluctuations. This applies, of course, only to cases where the direct method of using handbooks of enlarged indexes cannot be employed in the reassessment. The method of average coefficients is a highly tentative one, and should be regarded only as an auxiliary method, supplementing the basic method — that of reassessment in prices listed in the said handbooks. The bulk of the buildings and structures will be assessed on the basis of handbooks rather than coefficients, which will ensure uniformity in the approach to the solution of one of the most important and complex methodological problems in the reassessment of fixed assets.

Determination of the wear and tear of fixed assets is of special importance to the reassessment. Both the obsolescence and physical wear and tear of each object must be determined in the course of reassessment. By using the consolidated indexes in the price lists and handbooks, by using current prices and making corrections for obsolescent design of equipment, machines and means of transport, we determine the obsolescence of fixed assets. Their restoration value will show an assessment with proper reckoning of obsolescence. A comparison between the restoration value and the original value, at which fixed assets are currently reckoned, should indicate, it might seem, the sum at which the obsolescence is estimated. But such a computation may not always be correct or precise. In the course of the long period during which fixed assets were recorded in unchanging figures, not only the technique and technology of industry and construction but the scale of prices too continued to change. The influence of this factor can hardly be isolated from the change in the value of fixed assets resulting from obsolescence.

The present restoration value of fixed assets which is to be determined by the reassessment may be called the full value, for, like the original value, it fails to take into account the physical wear and tear of fixed assets. Both the one and the other reflect the value of fixed assets as new objects — in one case at prices which existed at the time they were built or put into operation (original value), and in the other at prices charged at the time the reassessment was made (restoration value). Hence the restoration value and the original value differ from each other in the level of prices but not in their structure.

In the determination of the restoration value of fixed assets, as well as of their original value, the establishment of their physical wear and tear constitutes a separate problem. It may be added that it is no less complex a problem than the more general problem of determining the restoration value of fixed assets. In the existing system of fixed asset accounting the indexes of their physical wear and tear are reflected separately from the indexes of the original value of fixed assets. This makes it possible to find at any given time the residual value of fixed assets as the difference between the full original value, on the one hand, and the wear and tear, on the other.

The principles used at present to determine the residual value will continue to be applied in the future too. They will remain intact after the reassessment also. For the restoration value, like the original, must be complete, i.e., exclusive of the factor of physical wear and tear of fixed assets. This wear and tear will continue to be reflected separately. A reassessment of fixed assets shows primarily the change in their full value. But there is a certain interrelation between full and residual values. To determine the new residual value of fixed assets it is necessary first to determine the value of their physical wear and tear as expressed in current prices, i.e., to establish the exact value of the wear and tear.

The physical wear and tear, like the restoration value, must be determined for each object separately. This has to be emphasized because the linking up of the reassessment of fixed assets by individual objects with the determination of their physical wear and tear by individual objects constitutes a major methodological requirement in the entire work of reassessment. Yet, in current accounting the physical wear and tear of fixed assets is shown, as a rule, not by separate objects but as a whole, or at best by large consolidated homogeneous groups.

The method of determining the physical wear and tear of fixed assets accepted for current accounts is farily simple. It consists of fixing the value of the worn-out parts monthly on the basis of average amortization charges applying to the fixed assets of the enterprises. The amortization charge and the value of the wear and tear of fixed assets for any given period are identical quantities, unless capital repairs are made during the same period. By partially restoring fixed assets these repairs reduce the wear and tear and increase the residual value of fixed assets.

It has long been demonstrated, however, that the wearing out of any part of fixed assets does not proceed evenly. If we trace the course of wear and tear and describe it graphically, we get a typical curve showing that no repairs at all are required during the first years of operation, while in subsequent years the scale on which repairs are made differs during different periods. These fluctuations in wear and tear are not reflected in the accounts in which wear and tear is recorded equally each year.

This convention has been accepted for the sake of simplicity. What is required here is to determine the average wear and tear index for all fixed assets or large groups of assets.

The fact is, however, that even in this summarized form the indexes of wear and tear of fixed assets are not sufficiently exact. This manifests itself particularly at the time the fixed assets are discarded. It is then that the hidden accounting flaws come out into the open, revealing the totally unjustified gap between the residual value and the real, or so-called liquid value of fixed assets. In essence, this discrepancy, which is measured in enormous sums annually, is nothing but an underestimation of the wear and tear of fixed assets and its incomplete reflection in production costs. This situation is due to many factors, none of which could be singled out as the decisive one. It can be explained by shortcomings in the determination of amortization charges; flaws in determining the value of the fixed assets themselves, which is used as a basis for determining the wear and tear; excessive cost of capital repairs, which causes the wear and tear indexes to be understated; and lastly, failure to differentiate the wear and tear of the fixed assets among themselves. The reassessment of the fixed

assets coupled with the preparation of new amortization norms should serve as a means of solving such questions.

The diversity in the structure of fixed assets makes it impossible to devise a single uniform method of determining their wear and tear. A different approach is required. Different methods of determining wear and tear may be practiced under different conditions, but it is necessary first to decide which particular method of computation is preferable in any particular case.

The most complex method of determining wear and tear is the one requiring an examination of the technical condition of each object at the time of its reassessment. This, essentially inventory, method of determining wear and tear is widely used in housing and communal services. The data of a technical examination are used directly for other purposes too, above all to determine what repairs are needed and which of them are of a priority nature and must be made immediately. Careful examination of the technical condition of the objects is an essential prerequisite for proper organization of repair work.

To prevent crude approximations from developing in the calculations, so-called auxiliary accounting tables are used in the housing and communal services, containing technical descriptions and concrete indications of the degree of wear and tear. They may be used to determine the wear and tear not only of the object as a whole but of its individual parts. In this case the method of assessing wear and tear on the basis of the technical condition of the object rests upon definite norms. The auxiliary tables represent precisely such tried and tested norms. They may therefore also be of considerable use now in the reassessment of fixed assets.

But the method of determining wear and tear by the technical condition may prove to be necessary not only for objects covered by the auxiliary tables. No such tables are available for production objects. However, in determining the technical wear and tear of these buildings the same scale may be used for all structural elements which are similar to those employed in residential buildings. Hence, the auxiliary tables may prove to be useful in the reassessment of a considerable part of the fixed assets in industry too, though limited to buildings only.

As for machines and equipment, no norms exist for direct or indirect use in investigating their condition. Of greater importance here is expert assessment, the quality of which depends largely upon the qualifications of those who conduct it, upon their technical competence in the first place.

The reassessment covers a great mass of civerse enterprises which must carry out with their own forces the entire work of determining the restoration value of their fixed assets and their physical wear and tear. Under these conditions it cannot be expected that the method of fixing wear and tear by the technical condition should be universally or predominantly employed in all cases. Obviously, this method will be more widely applied to buildings and structures than to equipment or means of transport.

The periods of service fixed for buildings have been less verified by practice and are therefore less reliable. The actual life of many types of buildings and structures often substantially differs from that shown in the norms. In some cases the date when the building was commissioned cannot be established with certainty. Some of them were used for years without a formal record. For all these reasons assessment of physical wear and tear by an examination of the technical condition is in many cases more justified for buildings than for other objects.

As already pointed out, different forms may be used in applying this method of determining wear and tear. Where auxiliary tables are available the wear and tear of an object is determined as the sum total of the wear and tear of its individual structural elements. It is also necessary to know, apart from the wear and tear of the structural elements, their share in the value of the object as a whole. Such data are contained in the handbooks of consolidated indexes referred to above. With their aid the computation of physical wear and tear by the method of technical examination of the object appears as follows:

Name of structural elements and types of work	Share of structural elements in value of building, according to catalogue of USSR Building Administration (in %)	Percentage of wear and tear of structural elements as shown by examination	Product of percentage of wear and tear by share of structural elements
Foundation	7	10	70
Walls and partitions	42	10	420
Ceilings	12	30	360
Roof	3	35	105
Floors	6	25	150
Doors and windows	4	20	80
Finishing	8	30	240
Internal sanitary and electrical fixtures	12	15	180
Others	6	20	120
Total	100	—	1725
In this case the wear and tear of the building is: $\frac{1725}{100} = 17.25\%$			

The need for such detailed calculations does not always arise. They are required chiefly for old objects, especially if their technical condition has not been examined for a long time.

The technical condition of an object may be determined by a simpler method, without fixing the wear and tear of each structural element. To a large extent the question can be decided on the basis of available technical data, such as

lists of defects, data of periodic inspections of buildings, etc., which are themselves reliable sources of information for assessing wear and tear. A supplementary on-the-spot investigation may also be needed to correct the data on the current examination of the condition of the object. Under these conditions the determination of the technical condition will consist of an expert appraisal of the physical wear and tear of the object as a whole, based upon those technical data which are available to the enterprise at the time the inspection of the object in kind is made.

In both of these methods of determining wear and tear — of the object as a whole, and of its individual structural elements — the aim is to reflect as fully as possible the actual amount of wear and tear of each object with a view to its particular operating conditions. This method of assessment of physical wear and tear is therefore necessary chiefly when dealing with objects that have undergone reconstruction, modernization or other improvements which lengthen their life and thereby reduce their physical wear and tear. Since such objects represent only some fraction of fixed assets, there is no need to resort to one and the same method of determining physical wear and tear, particularly the most complex of all the methods, that based upon an examination of the technical condition of the object. In such a measure as a complete reassessment of fixed assets it is important that the methods which are to be widely used should be simple and accessible. These conditions are met much more fully by the method which determines physical wear and tear by the length of service or the volume of work performed. If norms of average life of this or that type of object and data on the period of actual operation are available, the physical wear and tear can be easily determined by the formula

$$W = \frac{T}{A} \times 100$$

where W is the percentage of physical wear and tear;
T, the time the object has actually worked;
A, the normative average life of the object.

It must be pointed out that the use of this formula is facilitated by the presence of average length of service norms worked out at present for various types of machines, equipment and rolling stock as a basis for computing new amortization norms.

With all its tempting simplicity, however, the possibilities of using this method of computing physical wear and tear by service rendered in the given form are limited. When using the length of service norm it must be remembered that it is an average norm. The actual term of service of any particular object may differ for some reason very substantially from this norm and greatly exceed it. This limits the use of the method based on length of service norms to certain natural boundaries. The method can be applied to those objects which do not exceed the average term of service indicated in the norm. If the actual term of service exceeds that indicated in the norm a different method has to be used to compute wear and tear. The idea here is to substitute the average length of service norm by the individual period of service characteristic of the given object. In this case the formula is as follows:

$$W = \frac{T}{T+R} \times 100$$

where W is the percentage of wear and tear;
T, the time the object has actually worked;
R, the residual term of service.

Here expert opinion is required to determine the residual period of service, but this is given without a careful technical examination of the object and determination of the wear and tear of its various parts and structural elements. There is no need for such detailed data since we are concerned with objects whose residual term of service is supplementary to the average service norm known to us.

There is still another method of determining wear and tear by the length of service, the degree of wear and tear of the object being equal to the ratio of the difference between the normative and the residual term of service to the normative term. Supposing the normative term is twenty years and the residual term five years, then the physical wear and tear equals $75\% \left(\frac{20-5}{20}\right)$. This method, as distinct from all previously described methods, it is not to be used in the coming reassessment of fixed assets. Regardless of this, however, it should be emphasized that the very need for expert determination of the residual term of service arises only where the normative data cannot be used. The normative length of service should therefore not be taken as a basis if incompatibility with the actual length of service has been proved.

The reassessment of fixed assets consitutes an important national economic task. For this task to be solved successfully special attention must be given to the methodological questions connected with the determination of the current value of fixed assets and their obsolescence and physical wear and tear.

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Methods of Revaluing the Social Product in Prices Which Approach Values

A meeting of the Academic Council on problems of political economy held at the Institute of Economics of the USSR Academy of Sciences discussed the report of M. Z. Bor "On the Question of Methods of Revaluing the Social Product in Prices Which Approach Value."

The topic of the report, noted M. Z. Bor (Institute of Economics, USSR Academy of Sciences) has been dictated by the practical tasks of working out and analyzing the balance of the national economy. Under the present system of price formation part of the value created in some branches of material production is realized through prices of the output of other branches. Under these conditions it is extremely difficult to determine the proportions between the different parts of the social product and the national income, the ratios between given branches of production and social sectors, between the various elements of the process of reproduction. As is well-known, the balance of the national economy is elaborated first of all in prices in which the real process of realization of the social product is effected, that is, in prevailing prices. Only in these prices can the various elements of the balance of the national economy be thoroughly linked and the process of social production in all its interconnections and interdependence reflected. However, determining the structure of the social product and of the national income in terms of existing prices does not provide an accurate picture of what place the various production sectors or branches of the national economy occupy in the process of social production. Thus, the share of industry and trade is overstated and the share of construction, transport and especially of agriculture, on the contrary, understated; the shares of the state and collective farm sectors are inaccurately determined. In view of the fact that the greater part of the value of the surplus product is realized in prices of the produce of subdivision II, the share of the consumption fund is established inaccurately. Therefore the question arose, along with elaborating the balance of the national economy in existing prices, of calculating some of its elements in prices which would make it possible to determine more accurately the branch structure of the social product and of the national income. In the view of the speaker these prices should be of a kind which would in the greatest possible measure approximate value. The first stage of the economic calculations in this direction, one which is insignificant in itself, is to determine the newly created value at its place of production and not realization, which is important in calculating the branch and social structure of the national income. Such calculations have been carried out by the State Planning Committee of the USSR since 1953. To determine the magnitude of the national income at its place of creation, labor of various intensity and qualification, expended in each branch of material production, should be expressed as part of the average social labor by indirect method. Such a reduction to the average socially necessary labor in branches of the state sector, in the opinion of the speaker, can be effected by utilizing data on the labor payment fund according to the method suggested by Academician S. G. Strumilin. As for the collective farm sector, here substantial difficulties arise in determining the labor payment fund, which could be compared with the wage fund in the state sector. He noted that Soviet publications have indicated quite a number of ways for determining the labor payment fund in the collective farms: on the basis of the workday unit, that is, when in addition to cash payments for workday units payments in kind evaluated by one or another method are also added; on the basis of average payments for the working day in state farms; on the basis of the ratio between remuneration for labor and the net produce on state farms. Comrade Bor said that the first two methods were unsuitable for solving the question under discussion. The first method was unacceptable because the actual remuneration for labor of collective farmers (regardless of how the estimate of the part of the income per labor unit in kind varied) contained elements of the so-called "redistribution" of the net income. The second method, applied in the calculations of the USSR Central Statistical Board, in the view of the speaker also had some serious failings: in view of different levels of labor productivity a larger net product is produced on state farms (in equal prices) per unit of labor than on collective farms. Hence, the use of this method would lead to exaggerated indices of the amount of national income created in collective farms.

The speaker believes that the most suitable way of calculating the size of the national income created in the collective farm sector is the third method by which the net produce of state farms and collective farms is first reevaluated in uniform prices, and then on the basis of the ratio between the net produce and the labor payment fund in state farms, a conditional fund for remuneration of labor in collective farms is also computed. After determining the comparable labor payment fund in all branches, the size of the national income at its place of creation is calculated in the following way. A ratio is established (link coefficient) between the net product and the labor payment fund in the national economy, and the labor payment fund of each branch (sector) is multiplied by this coefficient.

The determination of the size of the labor payment fund is a serious but not the sole difficulty. The fact of the matter is that it is impossible to directly compare the net produce of a given branch and the calculated labor payment fund by means of the methods indicated. The net produce of a branch is a combination of parts differing in character. A certain part of the produce of industry and construction, and a considerable part of the produce of agriculture go directly into the fund of personal consumption and the fund of accumulation in kind. The shift through the medium of the price mechanism of part of the newly created value from one production sector (branch) to another sector (branch) only takes place in the form of marketed output of the branches of the national economy. Therefore, when making the calculations connected with determining the magnitude of the national income at its place of creation, we single out the part of the entire mass of net produce which is linked with the process of transfer of value between the sectors and branches (mainly, through the turnover tax).

The link coefficient between the newly created value and the labor payment fund is calculated for the produce

connected with the transfer of the national income. By applying this coefficient we derive the answers to the questions as to what part of the national income is transferred through the mechanism of prices and how much greater or less is the net produce calculated at its place of realization then the net produce at its place of creation.

But this calculation does not provide a clear picture of the full amount of the national income. In order to ascertain the full amount of the national income we have to bring the part of the produce incorporated in the process of consumption in kind and expressed in prices which are below value to the general level. Hence, we have to apply to the labor payment fund, calculated for produce unconnected with the transfer of the national income, the coefficient linking the labor payment fund with the net produce at its place of creation. The foregoing methods make it possible to determine the size of the newly created value (national income) at its place of creation.

The next stage is to calculate the fund for replacing material expenditures and the whole of the social product in prices approximating value. The price of products of any branch included in subdivision I of production may be divided into the following three parts:

(a) the price of products of this branch consumed in the same branch;

(b) the price of products of other branches consumed in this branch;

(c) the price of products which embody the newly created value.

Insofar as the first and third parts of the aggregate price of the product of any branch undergo a more or less significant change as a result of the recalculation of the national income, this will cause a change in the prices of that branch where the products of another branch are used as material expenditures. In the conditions of interdependence of branches in the production of the social product every change in prices of this kind in any branch will cause a multiple change in prices in branches directly or indirectly associated with it. This in turn will lead to a change in prices in the given branch. This mutual influence of price changes can be fully taken into account by means of successive approximations (iterations). The calculations carried out show that in a restricted circle of adequately enlarged branches such iterations will be few.

The foregoing method of recalculating the social product, the speaker went on, is based on the experience accumulated in the Central Statistical Board and the State Planning Committee in calculating the national income at its place of creation. However, these calculations have a significant shortcoming, for as a result of such a re-evaluation of the social product the general price level of products of subdivision II is somewhat lowered. In Bor's opinion it is also inaccurate to assume the same structure of newly created value in the collective-farm and state sectors. Hence, the speaker also undertook an experimental re-evaluation of the social product by another method.

Proceeding from the assumption that the sum of prices of the produce of subdivision II of the state sector is equal to its value, comrade Bor calculated the rates of the surplus product, which differed for the state and collective farm sectors, but were the same for subdivisions I and II within the limits of each sector:

$$m_1 = \frac{\text{II } m + 1\ m}{\text{II } v + 1\ v}$$

In accordance with these norms the national income was calculated at its place of creation and by means of successive approximations the whole of the social product was re-evaluated.

The calculations carried out, in Bor's view, not only enable us to determine correctly the structure of the social product, the national income and major proportions, but indicate the feasibility and expediency of reconstructing the system of price formations on a value level. In so doing there is no need to change the price level for products of subdivision II and to revise wages. The balance between the labor payment fund and the sum of prices of articles of consumption is not violated in the re-evaluation by the second method.

The first speaker in the discussion was Academician S. G. Strumilin, whose main points appear in his article published in this issue.*

L. A. Vaag (Moscow Power Institute) pointed out that the method of calculating the social product and the national income on the basis of prices in which the surplus product (m) is proportional to wages (v), as suggested by the speaker, is unacceptable, for it ignores the difference in the technical equipment of plants, the varying capital investments in different branches of the national economy and in individual plants in one and the same branch. In Vaag's view, in a socialist society price formation and the determination of the efficacy of capital investments should be based on prices of production. Only prices based on price of production will enable solving of these problems from the viewpoint of the whole national economy, the whole of society. This is precisely why the planning institutes and other institutions, in calculating the efficacy of capital investments, apply the method of determining the period of recoupment, which actually leads to the evaluation of expenditures in prices of production. Taking into account capital investments in allied branches, planners proceed from uniform periods of recoupment and make technical and economic comparisons actually on the basis of prices of production.

The speaker's calculations, in Vaag's opinion, are highly abstract and can hardly be of much use. It is possible, as some people suggest, to base the calculations on all available principles of price formation (in value, prices of production, etc.). However, L. A. Vaag thinks that it will be impossible to compare the results obtained. An economically substantiated principle of price formation can only be determined by its verification in production with an eye to obtaining the maximum physical volume of national income with given expenditure of social labor (human labor and labor embodied in products).

V. D. Belkin (Institute of Electronic Control Machinery, USSR Academy of Sciences) said that the methods proposed by the speaker are inaccurate and that it is impossible to determine the value of individual products with them. However, at present there are methods and technical devices, computing machines, which make it possible to calculate accurately the value of products by solving a system of linear equations. The starting point for drawing up the equations should be the average branch calculations of production costs for every given product. These calculations are collected and elaborated by the State Planning Committee of the USSR during every considerable revision of prices. In this case it is more convenient to perform the electronic machine calculations by means of the method of successive approximations (iterations). It should be pointed out that in order to obtain a conformity between profits and the sum of prices of products included in the surplus product, it is necessary during each iteration, along with their re-evaluation, to change the norm of the surplus product.

* Editor's note: The article referred to will be translated in a forthcoming issue of Problems of Economics.

Despite the fact that such a calculation is relatively simple, the determination of value and re-evaluation of the social product and the national income on the basis of value would hardly be worth while.

Belkin expressed agreement with L. A. Vaag that calculation of prices of production would be very useful in price formation and determination of the efficacy of capital investments.

The assertion that the use of prices of production conflicts with objective economic laws of socialism is unfounded. Economically substantiated prices are prices which stimulate fulfillment of planned assignments and ensure material advantages for plants for the best possible utilization of their capacities in the interests of fulfilling the plan. Prices based on the formula of prices of production, in Belkin's view, satisfy these requirements best. The use of prices of production is also feasible in analyzing the balance of the national economy. Determination of the branch structure of the national income on the basis of value would give an inaccurate picture of the actual participation of branches in the production of the national income as an aggregate of material goods used for consumption and accumulation. If we were to trace the changes in the branch structure of national income determined by this method over a period of years, we would find that the share of the branches, the technical equipment of which is growing at the most rapid rates and where manual labor is declining, diminishes. At the same time there will be an increase in the share of the branches where manual labor is employed on a larger scale and where, for this reason, the share of wages is also higher.

A. I. Notkin (Institute of Economics, USSR Academy of Sciences) said it was important to calculate all the main indices in the balance of the national economy of the USSR — the social product, national income, the replacement, accumulation and consumption funds for produce of subdivisions I and II and individual branches of material production and the social sectors — not only in current prices but also in value. This would make it possible to reveal the real proportions in the production and distribution of the social product and its parts, and also more or less fully to establish how the net produce is redistributed between social sectors, the production and non-production spheres, etc. The question of calculating the value of produce is also very important in planning prices. To establish economically sound prices, methods of approximate calculation of value have to be found so that a deviation of prices from value should take place within definite limits and in order that it should become possible, on the basis of current prices, more or less accurately, of course, within possible boundaries to take account of the actual expenditure of labor. We cannot, in calculating the social value of the product, proceed directly from labor expenditures of differences in the quality of labor in town and countryside and in individual branches. The only effective way is to recalculate current prices, firstly, by determining the norms of the surplus product and, secondly, by re-evaluating material expenditures. Prices approximating value can be obtained as a result of several approximations. For this purpose electronic computers may be used. It goes without saying that in the balance of the national economy and in price formation it is essential to proceed not from the individual but from the social value of products.

The method selected by the speaker for calculating the balance of the national economy and recommended also by a number of other economists is, in Notkin's opinion, correct. Some economists oppose this method suggesting, instead, formation of prices and value calculations in socialist economy on the basis of prices of production.

However, the price of production cannot serve as a means for determining the socially necessary expenditure of labor since it is normally either above the value of the produce or below it. Hence, calculations of the balance of the national economy based on the price of production will not reveal the labor proportions in the national economy. The price of production, as the basis of price formation, conflicts with socialist production relations and will inevitably run counter to socialist practice. The price of production is not a branch, but an inter-branch category. It presupposes the constant establishment of an average rate of profit for the whole of the national economy and the calculation of prices with due regard for this average rate of profit. But even under capitalism there is only a tendency toward the levelling out of the branch rates of profit, which are unequal by virtue of the difference in the organic composition of capital and its velocity of circulation in various branches. Therein lies the reason for the constant flow of capital from one branch to another.

Economists who suggest reforming Soviet prices on the basis of prices of production believe that this measure will tend to promote technical progress. But they forget that under the conditions of socialist economy the preferential growth of production of the means of production is not secured spontaneously but in a centralized planned manner. As for technical progress within individual branches or groups of allied branches, it is not ensured by the price of production even under capitalism; it is conditioned by competition within the branches, by efforts to acquire the difference between the lower individual and socially necessary expenditures.

Technical progress in individual branches of the national economy of the USSR is effected in a planned way. However, its material stimulation can and should be made dependent on the differences in the individual and socially necessary expenditures in given branches and groups of enterprises which operate in approximately the same conditions. These differences can best of all be brought out through prices approximating value. Branch rates of effectiveness of capital investments and the economic efficacy of introducing new technique in various branches can also be determined on this value basis.

It should, however, be emphasized that under socialism a higher profitability for individual branches does not signify that precisely they receive the greater enterprise fund and the greater accumulation fund. As we know, there has long existed in our country a differentiated approach to appropriation of profits into the state budget and the share of profits which goes into the enterprise fund.

Supporting, on the whole, the speaker's thesis on calculating value and re-evaluating the social product and the national income in balance calculations, Notkin noted that in some cases the methods suggested by M. Z. Bor require substantial adjustment. Thus, the re-evaluation of the net and gross output, created in the collective farm sector, should be done otherwise then is suggested by the speaker, namely — the whole of the fund of individual consumption of collective farmers should be re-evaluated in state retail prices. This, in fact, will mean applying a uniform principle in determining the labor payment fund in both the state and collective-farm sectors.

V. A. Sobol (USSR Central Statistical Board) said that both the report of M. Z. Bor and his calculations contain some very substantial contradictions. On the one hand, the entire calculation is founded on the supposition that the sum of prices is equivalent to the sum of values, and on the other, the report states that the monetary expression of the

social product in the prevailing system of prices is conditioned by "failure to take fully into account part of the newly created value." Comrade Bor proceeds from the assumption that the sum of prices of the output of subdivision II in the state sector is equal to the sum of values. But this is tantamount to asserting that the sum of prices of the whole of the social product is less than the sum of values. Thus, the logic of the calculation leads the speaker to a negation of the thesis on the equality of the sum of prices and the sum of values. Bor's calculation shows that under the existing price system part of the national income in terms of value is not taken into account. The national income can only be taken into account fully in terms of value if the prices of all products are proportional to value.

As Comrade Bor asserts, the results of his calculations can serve as a supplementary argument in favor of establishing prices at the level of value. Comrade Sobol disagrees with this. In his view, prices used for economic calculations and for determining the efficacy of capital investments and for other purposes should be established on the basis of the prices of production formula. These prices will take into account the differing fixed and working capital in individual branches and in various spheres of production. These prices will make it possible to compute the actual expenditure of social labor for the production of various types of output. For example, a calculation on the basis of these prices would clearly show that the electric power produced at thermal plants costs society not more, but less than hydro-electric power. It would prove the greater expediency of building thermal power plants, which require far less capital investments than hydraulic stations. But a calculation on the basis of prices established at a value level would give an entirely erroneous picture.

G. A. Dikhtiar (Institute of Economics, USSR Academy of Sciences) pointed out that carrying out concrete calculations of value is of great importance both for analyzing the balance of the national economy and for improving the practice of price formation.

The price of production is a category of the capitalist economic system and is entirely unsuitable for the socialist system. The application of a uniform profit rate conflicts with the law of planned, proportional development of the national economy. Proceeding from the Marxist understanding of the law of value, it is necessary to calculate value and not the price of production for both balance accounts and for price formation. Therefore, a further improvement and adjustment of the methods suggested by M. Z. Bor could form the foundation for the elaboration of measures designed to improve the system of prices.

The methodology of calculations suggested by Comrade Bor has a number of shortcomings, in Comrade Dikhtiar's opinion. In the first place paid labor, that is, wages, cannot be mechanically identified with necessary labor. If we were to proceed from such premises, increased wages in any given branch would automatically raise the net product calculated for this branch. Actually, however, the value created in the given branch may not change. Therefore, until wage relations are properly adjusted the m:v ratio for each branch should be corrected in accord with concrete conditions. It would be well to find correction factors for the wage indices applied in calculations.

Another failing of the methodology of the calculation under discussion is that in it the principle of equality of the sum of prices and the sum of value is not observed. This principle is declared by M. Z. Bor, but is not consistently upheld. The speaker derived his calculations of the value of the social product on the basis of the fact that the sum of prices of the products of subdivision II is equal to its aggregate value, whereas the sum of prices of the products of subdivision I is below value. As a result we find that the sum of prices of the whole of the social product is below its aggregate value.

M. V. Kolganov (Institute of Economics, USSR Academy of Sciences) said that in examining the question of economic calculations we must first of all substantiate the principle of price formation. Of all the proposed principles for establishing prices Kolganov thinks price formation on the basis of prices of production is the most suitable.

Socialism inherited from capitalism a system of productive forces and certain methods and ways of organizing the economy. Needless to say, the category of prices of production in Soviet conditions is but a semblance of the capitalist price of production. Actually it has nothing in common with it for its composite elements (costs of production and profits) acquire a new quality.

Kolganov expressed the view that the fact that it is impossible to determine the absolute magnitude of value speaks in favor of price planning on the basis of prices of production. The price of production may be calculated without any great difficulty and with absolute precision. Determination of prices in accord with price of production is also important because of the fact that all enterprises are thereby placed in equal conditions of accumulation and expanded reproduction; at the same time the results of their activity may be accurately recorded. The price of production provides a sound criterion for planning prices and a solid foundation for cost accounting.

V. P. Krasovsky (Economic Research Institute, USSR State Planning Committee) pointed out that M. Z. Bor's report, which contains a number of national economic calculations and reveals the difficulties encountered in their concrete analysis, merits serious attention.

Dwelling on the proposal of some economists to proceed from prices of production in price formation and in determining the efficacy of capital investments, Comrade Krasovsky said that there were some positive elements in the concept. The advocates of prices of production try, in their economic calculations, to take into account the factor of time and also the factor of occasional diversions of resources for capital construction. They suggest that attention be given to the social effect of capital investments in the form of compulsory "contributions" by each branch to the total fund of the surplus product for purposes of expanded reproduction. But it is impossible, however, to agree with the proposal to establish a uniform profit rate for all branches of production. The fact of the matter is that the rate of technical progress in various branches of production and the rate of changes in labor productivity are not the same; the organic structure of capital, the relationship between fixed and working capital, the duration of the production cycles, are different. Finally, although the sphere of mutually substitutable products is extensive, it is by no means unlimited and for this reason it is impossible to transfer investment at will from one branch to another even if great possibilities of accumulation prevail in the allied branch. Such transfers of capital expenditures, suggested by the advocates of the price of production, would lead to disproportions in national economic development.

If, however, the sphere of action of prices of production is confined only to the framework of a given branch and inter-branch distribution of capital investments is effected in accordance with existing balance methods, the distinction between this method and the generally accepted way of determining efficacy on the basis of periods of recoupment would actually be obliterated.

In Comrade Krasovsky's opinion the differing views on

price formation and determination of the efficacy of capital investments are not as conflicting as they used to be. On the contrary, there is a certain rapprochement. However, despite all this the general picture does not as yet accord with the requirements of national economic planning. Neither the general coefficient of probability for all branches nor even the intra-branch coefficients (if it is a question of more or less large branches) conform to the needs of planning. In the existing system of prices, if we were to be guided by a uniform coefficient of branch probability we would, for example, have to retard the development of the coal industry; under a uniform coefficient, in non-ferrous metals we would have to give preference to the development of production of tin, etc. These considerations render questionable the suitability of the suggested methods for solving the problem of price formation and determining the efficacy of capital investments. They are evidence of the fact that these problems can only be solved on the basis of practical calculations. Therefore, the method of concrete calculations proposed by M. Z. Bor, as well as the proposal for calculating value on the basis of various schemes with the use of electronic computors, merits serious attention.

A. A. Belov (Institute of Economics, USSR Academy of Sciences) said that he disagreed with the opinion of the speaker that a deviation of prices of means of production below value does not, in present conditions, correspond to the interests of national economic development. The speaker, Belov said, advanced no proof to confirm his viewpoint, apart from citing the fact that in existing practice there are a number of difficulties in determining the branch and social structure of production of the social product and the national income. It goes without saying that a different level of prices for means of production and consumer goods creates definite difficulties in accounting and planning certain synthetic indices. But is this really an adequate reason for raising prices of the means of production? The relatively low level of the prices for the means of production has played and continues to play a positive role in the development of the national economy.

The economists who are suggesting an all-at-once, sweeping rise in prices of means of production disregard the complexity and the specific features of price formation in our conditions. Higher prices for the means of production would, to some extent, retard renewal of technical equipment in industry and especially in agriculture, and this may have a negative effect on agricultural development and on the collective-farm economy.

Belov considers incorrect the speaker's thesis that in determining the level of prices for certain types of products we should proceed from an identical ratio of the net income to paid labor. It is difficult to combine such a solution of the matter with the task of better utilization of fixed capital, of strengthening the interest of enterprises in the most rational utilization of production capacities, of improving cost accounting and reducing production costs.

Belov opposed the proposals for reforming prices on the basis of value as well as on the basis of prices of production. It is assumed in both instances that the deviation of prices from value in Soviet conditions is an exception to the rule, whereas actually in many cases this is dictated by a number of very important reasons (relationship between demand and supply, mutual substitutability of certain kinds of produce, territorial differentiation of prices, variety of wholesale prices, etc.). Establishing prices at a uniform level would diminish their role as instruments for influencing economic processes. Nevertheless, the suggested concrete economic calculations for determining the level of prices of individual varieties of produce may help to eliminate shortcomings in existing prices.

Belov expressed the view that the method outlined by the speaker was of some interest for the balance of the national economy. But for determining the level of prices for individual kinds of products the method and calculations proposed by the speaker should be regarded as a very rudimentary stage in solving the task. Belov considered that the efforts to improve the system of prices should be based above all on the verification and minute study of production costs.

D. D. Kondrashev sharply criticized the economists who believed it was inadvisable to make any substantial changes in the existing system of prices. The defects in the practice of price formation are so significant, in his opinion, that the selection of given technological processes of production or variants of capital investments on the basis of existing prices at times causes grievous injury to the national economy. In many instances production of less essential, but highly profitable items is increased to the detriment of the production of goods which the national economy and the population need more. Kondrashev said that the proposed principles of price formation should be tested on the basis of concrete calculations. These calculations should be carried out by the Institute of Economics of the Academy of Sciences of the USSR on the basis of data of the Central Statistical Administration of the USSR.

Improvement of price formation, in the opinion of Kondrashev, should follow the line of levelling out the profitability of different branches and enterprises. The method of establishing prices suggested in the report cannot be regarded as economically sound. At present the most appropriate principle of price formation is to construct prices on the basis of average branch production costs plus an addition for profits in proportion to these. This will make it possible to employ the same yardstick for all branches and enterprises in analyzing fulfillment of plans in value indices.

P. S. Mstislavskii (Institute of Economics, USSR Academy of Sciences) pointed out that the calculation of the social product and the national income according to their value, and a comparison of this estimate with their magnitudes computed in existing prices, make it possible to establish how prices deviate from value, to assess the real scale of redistribution associated with these deviations. The calculation of value, that is, of the social labor embodied in the gross product and national income, is of great importance for national economic planning and price formation. It is, however, wrong to assume that prices can be established exactly at the level of value. Prices must, as a rule, deviate from value in view of the redestributive functions inherent in them, as well as the functions of economic stimulation of purchases of various commodities. As for an analysis of the balance of the national economy this calls for a calculation of value and not of prices of production.

The calculations made by the speaker do not make it possible to measure the value of output accurately. There is another, a more accurate method of calculating the value of a product — by solving a system of linear equations. It is also essential to calculate the socially necessary labor time. This task can and should now be solved with the help of electronic computers. Referring to the methodology of calculating value proposed by the speaker, P. S. Mstislavskii said it was wrong to proceed from the existing scale of prices for the output of subdivision II. The right thing to do is to take the average level of prices as a basis, as was suggested by Comrade Kronrod. Only then will an equality between the sum of price and the sum of values be ensured.

In the opinion of Y. G. Liberman (Institute of Economics, USSR Academy of Sciences) the method advanced by the speaker evokes objection because it is impossible to say how accurately wages reflect differences in the expenditure of abstract labor. Differences in payments for labor of equal quality show that wages may incorporate elements of the net income created by other workers than those to whom it is paid. It is also wrong to assume that the rate of the net income is identical in all branches of the national economy. If the magnitude of the whole of the newly created value is proportional to the mass of the newly expended human labor, then the change in the magnitude of the net income likewise depends on the changes in its productivity. The growth of labor productivity is expressed in an increase in the relative share of the net income. Inasmuch as in individual branches which differ in technical level, the extent of changes in labor productivity varies, there can be, in Comrade Liberman's opinion, no uniform rate of net income identical for all branches. Simultaneously, any single uniform rate of profitability does not conform with the actual material resources of accumulation, directed in a planned way into each given branch on the basis of the requirements of the proportional development of the national economy.

Y. G. Liberman assumes that only the equivalent actually refunded to the various branches by society can have any real significance in economic calculations. This equivalent can deviate from the value created in the given branch and also from the realized price. The refunded equivalent not only includes the net income realized in the price, but also all the centralized capital investments in this branch effected by the state in the form of budget financing. The distribution of the newly created value is effected both through the medium of prices and the budget, and the greater the role of the budget the lesser the role of price.

After M. Z. Bor's closing speech, in which he presented certain additional considerations on a number of points touched upon during the discussion, the presiding chairman, Y. A. Kronrod (Institute of Economics, USSR Academy of Sciences), summed up the results of the discussion. Today, he said, there is a great need for developing scientifically substantiated synthetic economic calculations which would help in the effective solution of many important questions of national economic planning. The determination of value is of great significance for the development and advancement of cost accounting, for the material stimulation of the fulfillment of production plans, for the elaboration of a proper method for determining the efficacy of capital investments, for promoting financial and credit relations in our economy, etc. The role of these calculations is also important for working out economic problems of cooperation within the framework of the world socialist system, of the efficacy of foreign trade, etc.

The task of the present meeting was, above all, to discuss the methodology and method of concrete economic calculation, namely calculation of the social product in measurements approximating value. But in discussing this calculation it was naturally impossible not to touch upon the question of what should form the basis of prices: value, price of production, or some other modification of value. Recalling what was said on this issue, Comrade Kronrod pointed out that unfortunately some comrades posed the problem unclearly and incorrectly. Thus some economists, Comrade Vaag for example, asserted that the price of production was value. There were also attempts to substitute for the Marxist conception of value one or another variety of the conception of the productivity of the factors of production. According to these conceptions, labor of equal intensity and qualifaction in various branches of production creates, during one and the same period of time, an unequal value; the magnitude of the created value depends on the degree of technical equipment of the given branch. In other words, the mass of value created by labor is not determined under the given average conditions of production, including the average technical equipment of each given branch, but by some average conditions of technical equipment of labor in the national economy as a whole. It is not difficult to discover here an attempt to substitute for the Marxist theory of socially necessary labor, the theory of labor value, a theory of productivity of the factors of production, according to which value is determined not only by direct expenditure of embodied and living labor for the production of a commodity but by one other element; in determining value we should allegedly take into account the "assistance" rendered in the creation of value by the expended means of production which facilitate the growth of the average level of labor productivity. The fallacy of these views is clearly evident.

Kronrod then dwelt on the position of those economists who suggest that the price of production should form the basis of price. One argument of the advocates of this position is that the realization of commodities on the basis of value was characteristic of the simple commodity economy. Capitalism, on the other hand, causes a modification of value. Socialism allegedly requires yet another stage of modification. But that is merely an external analogy. The modification of value in the form of the price of production under capitalism, as we know, is linked with a certain factor — with the process of distribution of surplus value among capitals. Under socialism there is no place for this, since there is no competition among capitals.

Also unfounded is the assertion that the price of production under socialism is allegedly conditioned by the different degree of technical equipment of individual branches of production, and that it is a factor which in practice helps to take account of not only human labor but also of labor embodied in the means of production. Actually, however, it is impossible by means of the price of production to reckon with the real expenditure of labor, for in branches with a high organic composition of capital price would exceed value, and in branches with a low organic composition of capital it would be below value.

Upholding the price of production, the advocates of this conception assume that the price of production reflects actual expenditures on production, and therefore, prices based on prices of production will facilitate a more effective utilization of capital investments.

However, this whole system of arguments does not hold water. The price of production shows only one thing, namely: what is on the average in the national economy, the mass of value of the produced surplus product which is associated with a definite mass of value used in capital in production. But this is merely an abstract average calculation. One and the same amount of value of the surplus product in different branches is produced with different amounts of operating capital. In view of the fact that at any given moment there are definite social needs and a definite mass of different products to be produced, society cannot keep shifting capital investments to places where they will be able to create a relatively greater magnitude of value of the surplus product. Objectively, society has to produce the same amount of value of the surplus product under varying degrees of capital provided for human labor. Hence it follows that prices of production cannot serve as a guide for the most effective, optimum inter-branch distribution of capital investments. For this very reason prices of

production also do not show what amount of advanced capital is required by society for the production of this of that product.

Replying to Comrade Sobol's remarks, Y. A. Kronrod pointed out that the example in the case of electric power cannot serve as an argument in favor of prices of production as a basis for price formation. The power produced by the thermal and hydraulic plants is a product of one and the same branch — electric power — whereas the price of production is an inter-branch category. Needless to say, the degree of technical equipment of various enterprises within the framework of one branch is reflected in the calculation of the value of output of the given branch. But the concept of an intra-branch price of production is economically senseless. The thesis of a uniform rate of efficacy of capital investments for the whole of the national economy, of equal periods of recoupment of capital investments in diverse branches, is groundless under Soviet conditions. If, however, we have in mind differentiated periods of recoupment in the branches, as applied in planning practice, then here we employ not the price of production, but value.

It is sometimes said, Comrade Kronrod went on, that prices should be established on the basis of prices of production in order to carry out cost accounting. However, as we know, for cost accounting in some given branch, as, for example, in the textile industry, the important thing is the rate of profitability of individual enterprises in it, and not the rate of profitability of, let us say, metallurgy and the like. The elementary foundation of cost accounting is the reduction of individual value to social value, and the price of production has nothing to do with this.

Hence, concluded Comrade Kronrod, the real basis for prices is the expenditure of socially necessary abstract labor, that is, value. However, we cannot mechanically establish prices for every individual commodity at the level of value; the price may deviate from value for various reasons (redistribution of the national income, stimulation of production of various goods, economizing on means of production, etc.). However, these deviations of prices from value for individual commodities should not cause the general price level for the output of subdivisions I and II to deviate from value.

Passing on to the method of re-evaluating the social product, Y. A. Kronrod noted that the speaker had carried out a very interesting experiment which went beyond the framework of earlier calculations. However, both the method of calculation and its theoretical substantiation have a number of shortcomings.

In Comrade Kronrod's opinion the speaker allows for some theoretical inaccuracy when speaking about reducing labor to the average social labor in terms of wages. Wages reflect the necessary labor but very approximately, with substantial deviations from it. It is, therefore, essential to make substantial adjustments in the wage index, if it is to be used for calculating the social product in prices approximating value. The method of re-evaluating the net output of collective farms, as suggested by the speaker, is somewhat more precise than the one applied by the Central Statistical Board. However, it, too, is far from perfect, mainly because of the deviations of the wages of state farm workers from the necessary product, deviations arising from the conditions of reproduction on state farms.

Referring to the algorithm for calculating prices approximating value, as proposed by Belkin, Comrade Kronrod said that the method would require hundreds of thousands of natural calculations of expenditure for individual products. For statistical bodies this job is hardly feasible. Furthermore, the author of the algorithm proceeds from an identical m:v ratio for each product of the given branch, which is unacceptable. A uniform ratio is permissible for large groups of branches, but by no means for each individual product.

The use of electronic technique for calculating value in the national economy is promising. But it requires theoretical research which would make it possible, on the basis of the processing of available statistical data, to obtain reliable results.

Comrade Kronrod disagreed with Comrade Strumilin's criticism of the method of iteration (successive re-evaluations) used for evaluating the social product in prices approximating value. S. G. Strumilin assumes that it is sufficient to subtract magnitude m, created in subdivision I, but realized in the price of the output of subdivision II, from the price sum of the output of this subdivision and add it to the price sum of subdivision I, and the problem will be solved. However, he loses sight of the fact that the output of subdivision I makes a multiple circuit in the process of reproduction. In view of this a change in prices of means of production would repeatedly affect production costs and, consequently, prices of output in allied fields. Therefore, national economic calculations of the value of elements of the social product require repeated re-evaluation of output by means of successive approximations, and this cannot be accomplished through simple bookkeeping operations. Y. A. Kronrod agreed with Comrade Dikhtiar that the mechanical application of any method of calculating value is wrong in principle. Nonetheless, this does not at all imply that the application, in the aforesaid calculations, of a uniform link coefficient for the net product and the labor payment fund is not justified. For larger branches such an approach is fully worthwhile. Comrade Kronrod did not agree with Comrade Belov's thesis to the effect that the existing price system does not have to be seriously improved. As we know, a large share of production costs consists of material expenditures, the monetary expression of which depends on prices. On the other hand, production costs are the basic parts of price, and shortcomings in determining production costs result in shortcomings in establishing prices.

Comrade Kronrod said in conclusion that it would be a good thing to hear a series of reports on economic calculations by supporters of views other than those of M. Z. Bor, on methods of re-evaluating the social product.

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(Kommunist — Communist — No. 9, 1959)

G. Osipov:

Technical Progress and the "Managerial Society"

New Conjectures Against Scientific Communism

The principal feature of the current epoch is the world-wide historical transition from capitalism to socialism. The form of economy that reigned supreme in the 19th century was the system of private enterprise, while in the 20th century it is the world socialist system of economy that is in the making. The private capitalist system of economy collapsed first in the Soviet Union, and later in the CPR and the other People's Democracies. The socialist system keeps growing in size and strength as more and more countries drop away from the capitalist world, which is getting weaker and wobblier on its feet. There is no power on earth now that can restore capitalism in the countries of the socialist camp. The enormous program outlined by the CPSU at its 21st Congress with a view to vigorously expanding the national economy and the cultural and living standards of the Soviet people clearly testifies to the continuous progressive development of the socialist society. This is also borne out by the great economic and cultural achievements of the People's Democracies.

The time has come when even the worst enemies cannot deny the successes of socialism and its triumphant historical advancement. But, fearing and hating socialism, they resort to new ways of apologizing for imperialism and counteracting the theory of scientific communism. The characteristic feature of this struggle is that the bourgeois ideologists, as a rule, do not come out openly in support of the regime of exploitation and monopoly rule. For the purpose of defending capitalism, they often permit ostentatious criticism of some of its individual aspects and "defects." Capitalism has so compromised itself by hideous exploitation and bloody wars that many bourgeois ideologists do not venture to call it by its own name. They declare it to be a bygone stage of social development and proclaim the beginning of a transition to a "new" social system, which is something between capitalism and socialism. They call this "new" system a "managerial society"* and maintain that it is "a blend of old and new social structures," "capitalism without crises and unemployment," or "socialism without a dictatorship of the proletariat." Gabriel Veraldi, the French bourgeois sociologist, asserts that "managerial society" is neither socialism nor capitalism, but a distinct type of state system in which "authority is exercised by specialists in the spheres of art, science and industry. In this sense, all modern states are technocratic in greater or lesser degree." (Gabriel Veraldi, "L'humanisme technique," Paris, 1958, pp. 153-154.)

The attacks of the bourgeois ideologists on the theory of scientific communism stem from an eclectic confusion in their concept of a "managerial society" between the socialist and capitalist countries, and from a denial that there are two fundamentally different social and economic systems. They distort the nature of the socialist society and state. The bourgeois and right-wing socialist ideologists try to represent the economic and organizational functions of the state, which are gaining in importance along with the development of socialist economy and technology, as a process of establishing a "technocratic state." For example, the French socialist leader Guy Mollet slanderously alleges that the concentration of economic functions in the hands of the state in the USSR leads to the establishment of "a new ruling caste of officials and engineers." (Guy Mollet, "Bilan et perspectives socialistes," Paris, 1958, p. 9.)

The bourgeois and right-wing socialist ideologists declare that Karl Marx's theory of scientific communism no longer fits the facts of today. They try to prove that the socialist revolution is being superseded by what they call "the managerial revolution," and that this supposedly discredits Marxism completely. They allege that humanity's future will be tied not to the working class, but to a select group of superior engineers, organizers, managers and bureaucrats. They hold the opinion that this "elite" group is beginning to play a decisive role in social life.

The bourgeois ideologists aim their assaults chiefly at the USSR, the first country to turn to the building of communism. They declare that the Soviet system is a state-monopolistic regime, and use the "managerial society" theory to slander socialism for the sake of preserving capitalism under a different guise.

The historical roots of the "managerial society" theory are embedded in the doctrines of the well known American economist Thorstein Veblen. In the early twenties Veblen advanced the "technocratic" conception of social development, which holds that the main role in society belongs to technicians and engineers. Being a bourgeois liberal, Veblen suggested the establishment of a "Council of Technicians," which would be instrumental in carrying out a series of radical reforms that would restrict the power of businessmen and place authority in the hands of technical experts. In contradistinction to Veblen's conceptions, the theory of "managerial society" which cropped up in the thirties rejected any deliberate remodelling of social reality. It declared that the new social force consisted not of the rank-and-file organizers of production, the technicians and engineers, but of an "elite" group of top-ranking managers and officials, which is supposedly automatically taking over the power of capitalists in the course of the historical process. This point of view was first expressed by the American bourgeois economists A. Berle and G. Means in their "The Modern Corporation and Private Property." Being unable to establish a connection between corporation executives and financial capital, Berle and Means came to the conclusion that 44% of the largest companies in the United States, holding 58% of the assets in 1930, were "controlled by managers"** (A. A. Berle, Jr. and Gardner C. Means, "The Modern Corporation and Private Property," New York, 1933, p. 94).

* The "managerial society" theory is a new variety of the so-called technocratic theories which explain social laws as a consequence of technological development and of the changing role of technicians in contemporary society.

**This and most of following quotations from American and English authors retranslated from Russian. Editor.

Their theory was soon refuted by authentic facts proving the close relationship between corporation executives and the financial oligarchy. It was, nevertheless, systematized and widely circulated by the American bourgeois sociologist James Burnham in his book "The Managerial Revolution." Burnham contended that in the course of technical progress capitalism was undergoing substantial changes, as a result of which power within society was gradually becoming concentrated in the hands of higher-level managers. According to Burnham, "We are now in a period of transition characterized by an unusually rapid rate of change in society's most important economic, social, political and cultural institutions. This transition is from the type of society called capitalist or bourgeois to the type which we will call a 'managerial society'."

Burnham's ultimate conclusion was that the main historical tendency of social development made inevitable the establishment of "managerial control" over society. He hardly utilized any concrete data. His whole conception was based on making a fetish of the social changes that accompanied the transformation of free-competition capitalism into monopolistic state capitalism. Burnham's theory was advantageous to the financial oligarchy. It was, according to the well-known American economist Victor Perlo, "widely popularized, turned into a part of the economic folklore of our time, and presented to students and the public at large as a dogma." (V. Perlo, "The Empire of the Financial Magnates," 1958, p. 67.)

The "managerial society" theory is a new ideological apologetic state of the financial oligarchy and an instrument for countering scientific communism. No wonder it is preached by a whole galaxy of the bitterest enemies of the Soviet Union and of socialism — a galaxy of bourgeois and right-wing socialist theorists of all brands.

The extensive propaganda of "technocratic" ideas, and the efforts to draw the attention of bourgeois intellectuals to those ideas with references to "new" facts and phenomena of the social process, necessitate an examination of their metaphysical and social roots.

The Gnosiological and Class Roots of the "Managerial Society" Theory

In exposing the gnosiological roots of idealism, V. I. Lenin wrote that every form of idealism was a barren flower, but one that grew on the living and blossoming tree of knowledge. The theory of "managerial society" is likewise a sterile flower, but one that stems from a distorted interpretation of the latest scientific and technical achievements in the period of the general crisis of the capitalist economic system.

The discovery of atomic energy and the inauguration of automation in industry were an unparalleled triumph for twentieth century science and technology. They signified a new qualitative leap in the development of human society's productive forces, a leap of far greater social importance than the discovery of fire and steam.

The progress of science and engineering over the past few decades has produced certain changes in the structure of capitalist enterprises and management. Financial institutions have strengthened their control over the activity of industrial enterprises. The management of an industrial enterprise is handled not by the private capitalist owner, but by an industrial manager. The manager is in no position to solve many of the intricate technical problems of management by drawing only on his personal experience and knowledge. He needs a large staff of assistants and office employees.

Industrial management has become more highly specialized; administrative staffs are graded into a wider range of ranks from the top manager down to the foreman. The present hierarchal system of management of a capitalist enterprise implies successive subordination of the lower rank to the higher. The changes in the organization of industrial management have led to the growth of office staffs. In the United States, for example, the total number of office employees in the manufacturing industry, in proportion to the number of production workers, went up from 12% in 1909 and 22% in 1939 to 26.5% in 1954. In Britain the administrative, technical and office personnel, in proportion to the number of industrial workers, reached 25.4% in 1954 (an increase of 13.6% over 1924).

Making a fetish out of technical progress and of the changes in the organization of industrial management provided the bourgeois and right-wing socialist ideologists theoretical grounds for their ballyhoo about a so-called "managerial revolution." The "hierarchal system of production," which allegedly lies "on the yonder side of capitalism," is what they regard as the main social factor of that "revolution." For example, the West German sociologist Paul Sering contends that the functions of the managers and administrative staffs constitute the "internal support of the new organization" (P. Sering, "Jenseits des Kapitalismus," Nuremburg, 1946, S. 49).

This idea was echoed by Leon Blum in his sensational "Introduction" to Burnham's "The Managerial Revolution." Blum stated that "modern industry requires a technical staff of constantly growing complexity, all the elements of which are interdependent, and a management that can belong only to carefully selected leaders — to the elite which keeps diminishing numerically" (J. Burnham, "L'ere des organisateurs," Paris, 1947, p. XII).

Bourgeois sociologists assign the top managers and "technocrats" to this "elite" group. Trying to assess the social consequences of technical progress connected with the introduction of automation, the West Germany sociologist F. Pollock asserts that the latter leads to the rise of "a hierarchy of automatic production, imbued from top to bottom with the awareness that it is an elite, and believing that in its majority it corresponds more to a totalitarian than to a democratic system" (F. Pollock, "L'automation, ses consequences economiques et sociales," Paris, 1957, p. 145).

The American bourgeois sociologist F. Gross advanced a similar idea. By making a fetish out of one of the possible social consequences of harnessing atomic energy to peaceful uses, namely the relative growth of the scientific-technical intelligentsia, he infers that the predictions about "a technocratic state" governed by a "class of technical leaders constitutes a fully justified hypothesis" (F. Gross, "Some Social Consequences of Atomic Discovery," American Sociological Review, 1950, Vol. 15, No. 1, p. 49).

Managers and technicians appear to be not only a "new" class in industry. According to bourgeois sociologists they have become, in the course of the "managerial revolution," society's dominating political force; they, and not the bourgeoisie, are the ruling class in the capitalist countries of today. Presumedly the working class' struggle against capitalism cannot lead to any essential results inasmuch as the basis of political and economic domination in society is not the "relations of ownership" but the "relations of management." According to British laborite Charles Crossland, "the dominant class under capitalism were the owners of the means of production. But now that active possession of the means of production has been supplanted by the passive possession of shares, control has passed into other hands and the traditional struggle between socialists and

capitalists is beside the point; the premise which holds that relations of ownership lie at the base of economic domination no longer corresponds to the truth" ("New Fabian Essays," London, 1953, p. 38).

The logic of all these arguments boils down to this: since the function of management of modern industry cannot be denied, it is senseless to fight the managers. In this connection the only difference the bourgeois ideologists see between the capitalists and the managers is that the former are not directly concerned with the management of production whereas the latter are. As for their attitude toward the working class, no distinction is drawn between the capitalists and the managers. "A revolution will be a fait accompli," wrote Leon Blum, "only it will not be a social revolution, but a managerial revolution. In this sense the coming revolution will do nothing for the great mass of proletarians, who will merely change their old masters and exploiters for new ones" (J. Burnham, "L'ere des organisateurs," p. xiii).

The theory of the "managerial society" pursues clearly defined class objectives. It defends the interests of the capitalists and the monopolies in the new, altered conditions of class struggle. By disguising monopolistic capitalism with the mask of the "managerial society" the bourgeois sociologists seek to divert the attention of the working class from the realization of its main tasks — the winning of political power and the expropriation of private property. They wish to substitute a struggle against managers for the solution of these tasks. Crossman writes that "the present enemy of freedom is the managerial society and centralization of the means of compulsion that go with it... Just as capitalism can be civilized by turning it into a state with an extensive system of social measures, so can the managerial society be civilized by transforming it into democratic socialism" ("New Fabian Essays," p. 12).

The basic contradictions of capitalism — between the social nature of production and the private form of appropriation, and between the productive forces and the relations of production — are being replaced by a "contradiction" between technology and the organization of industrial management on the one hand, and society, on the other. The fundamental class contradiction — between the working class and capital — is being supplanted by contrasting the interests of the managers and the working class. The purpose of such theories is to alienate the working class from the technical intelligentisa, divert its attention from its real enemies, and thus try once again to save the thoroughly rotten foundations of monopolistic capitalism.

The Principal Features of the "Managerial Society"

For the bourgeois sociologists, the "managerial society" is not a matter of the remote future. They claim that its features are clearly delineated and are displayed daily "on the horizon of modern social life." Actually all these features are distorted reflections of the real processes and phenomena that characterize state monopolistic capitalism.

What the bourgeois and right-wing socialist sociologists regard as one of the main new factors of modern social development is, first of all, the "disintegration of the class of capitalists" and their withdrawal from direct management of industrial production.

A notable development of the present era, in the view of the French socialist Andre Philip, is the "disappearance" of the big capitalists and the formation, along with the expansion of large-scale machine production, of a "new independent middle class," which has stopped clinging to old technology and is no longer threatened by technical progress (Andre Philip, "Le socialisme trahi," Paris, 1957, p. 18). In his opinion industrial mechanization stimulates the growth of this class. He says: "The further that mechanization proceeds in the key branches of large-scale industry and thus keeps reducing the percentage of workers employed there, the greater will be the proportion of the population employed in the crafts and commerce that supply the needs of the big industries, and the service sector will also grow" (Ibid.).

In presenting his sociological conceptions, Philip reveals a complete lack of understanding of the nature and status of the "middle strata" under capitalism. It should be borne in mind that capitalism engenders small-scale commodity production, even though it rejects it. Vladimir Lenin wrote that: "Small-scale production gave birth to capitalism and does so continuously. Capitalism inevitably produces more and more 'middle layers' (appendages of factories, those who work at home, or in small shops scattered all over the country to meet the needs of, say, large bicycle or automobile plants, etc.). Just as inevitably, these small producers are eventually thrown into the ranks of the proletariat" (Collected Works, Vol. 15, pp. 24-25). However, the general tendency marking the development of capitalism is not a growth, but a relative shrinkage of the category of small producers and their conversion to proletarians. In France, for example, the volume of work done by artisans dwindled between 1947 and 1955 by a third.

Andre Philip seems unable to understand the dual process that is now going on: the conversion of the "middle strata" engaged in production to a proletarian status, and the tendency to an increase in the number of people not directly engaged in the production of material goods, such as the functionaries and administrative personnel employed in industry, trade, banking and so forth. With regard to services it should be said that technical progress leads not to the growth, but rather to a decline in the number of people engaged in this field. The peculiar thing about automation is that it invades not only the sphere of production, but that of services as well. A lot of interesting facts could be cited in this respect. For instance, a big store in Chicago installed an automatic machine which takes an inventory at the end of the day of all of the unsold goods out of the approximately 2.5 million items usually put on sale. The machine also draws up the orders to be placed with the factories when the stocks on hand need to be replenished. Several years ago it was reported in the press that the British Ministry of Social Security was introducing an electronic machine, the use of which would put 2,630 out of 2,700 employees out of their jobs.

Philip's theory concerning the "middle strata" contradicts reality and cannot serve as an argument in favor of his thesis.

Does the separation of management from ownership of the means of production in large-scale industries imply the "disappearance" of the class of capitalists?

In support of his theory, Philip writes: "With a growth in the size of corporations and the increase of shareholders, the directors and executives of the big enterprises become more independent" (Andre Philip, "Le socialisme trahi," p. 21). The influence of the shareholders has become insignificant. The manager must prove the soundness of his plans not so much to the shareholders, as to the engineers and workers who will have to carry them out. "The social origin of managers has also changed. More and more they are getting their jobs not through inheritance, but by virtue of their education, professional experience and skill. They are people who are chiefly concerned with production; the profits of the enterprise are a token of their successful

ork, but their objective is production as such" (Ibid., . 22). Philip goes on to say that the managers understand he needs of the workers better and are easier for the comon workmen to approach than are even the samll proprietors. They show an interest in social problems and ecognize the need for economic organization; they comrise the most progressive element in economic life. The anagers, Philip concludes, "try to work for the people, ut without them, and they facilitate the advant of a techocratic administration which, for its realization, requires trict discipline, strong rule and a government with an uthoritarian tendency" (Ibid., p. 23).

It follows that the managerial "elite," with authoritarian owers, is growing as the nucleus of the "managerial soiety." But what happens to the working class? The workng class, in Philip's opinion, shows a trend toward differntiation; it is on the way to dissolution. Philip divides the orkers into skilled and unskilled and remarks that skilled orkers are in the habit of not thinking, but of blindly folowing discipline and orders. Their class consciousness oes not go beyond the bounds of their occupational conciousness.

Leaving aside Philip's theory of "the elite and the nasses," it is worth dwelling on the following two quesions: the separation of the ownership of capital from its pplication to production, and the strengthening of the role f the technical intelligentsia in modern society. Philip egards these as the "new" and principal factors indicative f the historical trend of social development.

A careful study of the structure of modern capitalism nd of the changes occurring in capitalist society reveals he false nature of Philip's argumentation. It is true that within the framework of capitalism a dividing line is being drawn between the ownership of property and its management. Formerly the capitalists not only owned, but maaged their enterprises, while now in the course of technical progress they have withdrawn from the direct management of production. The functions of management have been passed on to engineers, technicians and administrative personnel. But this certainly cannot be taken as proof f the formation of a "managerial society," nor is it a new trend in the development of modern society; it is an inherent characteristic of capitalism in general. The industrial magnate has no need to master managerial and organizational functions and to supervise production. These functions can be handled, and are handled, by a hired staff of administrative employees. Even Karl Marx had pointed out that "Capitalist production has itself brought about the situation in which the labor of the overseer, completely divorced from the ownership of capital, is always available in the street. Therefore, it has become senseless for the capitalist to perform the labor of the overseer" (K. Marx, "Capital," State Publishing House of Political Literature, 1954, Vol. III, p. 401). Vladimir Lenin had emphasized that the divorce of ownership from management was reaching great proportions in the epoch of imperialism, the epoch of domination by finance capital.

However, numerous facts of capitalist reality testify that the supreme control over production rests not with the directors and managers who own no property, but with the big financial and industrial magnates. It has been noted by the British economist Florence that the directors and managers of many British companies either belong to the group of the twenty largest stockholders, or else they are their representatives. Another good example is the Du Pont group which holds shares, and, directly or indirectly, seats on the boards of directors of such big companies as General Motors, United States Rubber, etc. The corporations and companies whose directors or managers own much of the stock, and can therefore exercise financial control, may certainly be included among those headed by the owners of capital.

As regards the social origin of top managers and directors, the overwhelming majority are relatives or sons of the company owners or responsible executives. According to the estimates of the American sociologists W. Warner and J. Abegglen, two-thirds of all the top executives in the United States are the sons of big capitalists, or of the presidents of corporations. Warner and Abegglen conclude: "No matter what our national ideals may be, America's business leaders constitute a group of The Elect, coming mostly from the upper strata of society. It can be argued that there are equal opportunities for all only in a restricted sense, because the more fact of being born within a group of high office holders greatly enhances one's opportunities" (W. Lloyd Warner and James C. Abegglen, "Big Business Leaders in America," New York, 1955, p. 14).

The financial oligarchy has all the economic power in its hands. Its interests are protected by a vast force of hired functionaries (the army, the police, the judiciary, etc.), always on the alert to crush ruthlessly any attempt to weaken the system of private capitalist ownership.

Bourgeois socialogists argue that another factor testifying to the elimination of capitalist rule is the replacement of the domination of capitalism by the domination of "anonymous" corporations and enterprises. Thus, Berle writes: "The capitalist himself is disappearing. He has already largely left the scene and, along with his departure, much of the controlling power of his appraisal of the market situation has vanished. It is the 'anonymous' corporation that now holds sway" (A. A. Berle, Jr., "The 20th Century Capitalist Revolution," New York, 1954, p. 39).

The replacement of the individual capitalist by an "anonymous" corporation, to which Berle and other bourgeois ideologists refer, is not a "new" factor in social development. It is a characteristic economic trend of state monopoly capitalism. As V. I. Lenin pointed out, capitalism has long replaced the independent, small-scale commodity producer by "stock companies, syndicates and other monopolies" (Collected Works, Vol. 26, p. 367). Big enterprises, especially the banks, not only absorb the small ones, but also "attach" and subordinate them by incorporating them into "their own" group, into their "concern." In the language of technical terminology, this is done by getting a "share" of their capital through the purchase or exchange of stock (V. I. Lenin, Ibid., Vol. 22, p. 200).

The corporation is an instrument for intensifying the domination of the monopolistic bourgeoisie. In no way does it change the essence of capitalism. It had been stressed by Karl Marx that capitalist relations of production are characterized not by the exploitation of individual workers by an individual capitalist, but by the fact that the whole class of capitalists exploits the whole working class.

The presidents, directors and managing boards running the corporations function as a collective capitalist. They get salaries that are actually a modified form of capitalist profit. In 1950, each of the 900 directors and managers of the big corporations in the United States received, on the average, an annual salary of 70,000 dollars. And such men as Crawford Greenawalt — the president of Du Pont de Nemours, Harlow Curtice — one of the four vice-presidents of General Motors, and Eugene Grace — president of the Bethlehem Steel Corporation, each received salaries and premiums exceeding half a million dollars in 1952. When he was the president of General Motors, Charles Erwin Wilson received a salary of $201,000 a year, plus $380,000 in

premiums, not counting his dividends, the amount of which is unknown (C. Wright Mills, "The Power Elite," New York, 1956, p. 129).

Similar facts may be cited with regard to the presidents and directors of lesser stock companies and corporations. No matter what forms it takes, capitalist profit remains as such even when it is the profit of a collective capitalist. Consequently the exploitation of the working class also remains, for it makes no difference to the workers whether they are exploited by one or by ten capitalists.

Another wrong assertion is that corporations are not capitalistic because engineers, workers, etc., can be their shareholders. The allusion to engineers and workers is merely another attempt on the part of the bourgeois ideologists to conceal the omnipotence of the financial oligarchy. In the United States and other capitalist countries, shares of big companies are widely circulated among small holders. But instead of lessening, this only augments the power of the financial plutocracy, permitting it to concentrate enormous additional capital and use it as its own, thus fleecing the small shareholders. There are cases in which big American financial monopolists exercise unrestricted control over a huge industrial corporation while owning a mere 5-10% of its capital stock. Statistics for 1952 show that there were only 6.5 million shareholders in the United States (less than 7% of the adult population). But among this 7% the shares were distributed very unevenly. In 1949 about 165,000 shareholders, accounting for only one-tenth of 1% of the population of the United States, received 42% of all corporation dividends. The American sociologist C. Wright Mills writes: "The idea of a really wide distribution of economic ownership is a cultivated illusion: at the very most, 0.2% or 0.3% of the adult population own the bulk, the pay-off shares, of the corporate world" (C. Wright Mills, "The Power Elite," p. 122).

It is clear that the diffusion of shares among small holders obscures the intense exploitation of the working class and the petty bourgeoisie.

Meanwhile, the technical manager, even though he is concerned with the operation of the enterprise, has no power and no influence. The whole direction of activity of the industrial enterprise is determined by the financial oligarchy, which, while replacing the individual capitalist, is itself a collective capitalist.

That is what the "decentralization of property" really is. Its basic purpose to "to subordinate to an incorporated center a steadily increasing number of formerly relatively 'independent' or, more correctly, locally isolated economic units. So, in fact, it amounts to centralization, to a further strengthening of the role, importance, and power of the giant monopolies" (V. I. Lenin, Collected Works, Vol. 22, p. 201).

The really new feature of modern capitalism that can be discerned in this process of centralization is an intensification of the social nature of production. What this implies, however, is not a transition to a "new" social order, but the preparation of material conditions for the transition to socialism.

To sustain their contention that a "new" society is in the making, the ideologists of "technocracy" also refer to the growth of the official and technical bureaucracy, which they identify with the managers.

At the Third World Congress of Sociology, the French bourgeois sociologist M. Crozier claimed quite seriously that the former "dialectical couple," the bourgeoisie and the proletariat, has now been supplanted by a new one, the class of employees (in place of the proletariat) and the new class of technicians and bureaucrats ("Transactions of the Third World Congress of Sociology," London, Vol. III, p. 317).

The reason offered for such assertions is the enlargement of the machinery of government in the capitalist countries. In this respect, the American bourgeois sociologist Peter Blau provides some interesting figures: in 1820 the United States federal government was comprised of 8,000 civilian employees; fifty years ago the number was up to a quarter of a million, and now it is 2.5 million (Peter M. Blau, "Bureaucracy in Modern Society," New York, 1956, p. 21). During the 45-year period between 1901 and 1946 the number of government employees in the United States increased tenfold, in Britain 15-fold, and in France by 3.5 times.

However, the swelling of the bureaucratic machinery in the capitalist countries testifies not to the emergence of a "managerial society" but to the natural process that is characteristic of capitalism in general, the decadence and disintegration of the bourgeois system.

Even in his time, V. I. Lenin had noted that one of the features of the general crisis of capitalism was "the extraordinary enlargement of the 'government machinery,' the exceptionally rapid growth of the official and military apparatus designed to intensify reprisals against the proletariat in both the monarchies and the freest republics" (Collected Works, Vol. 25, p. 382). As capitalism grows weaker, it feels a more pressing need to increase the staff of its employees whose main function is to uphold the despotic rule of capital over labor with the object of extorting maximum profit. Being parasites themselves, they have created another parasitical stratum — the bureaucratic officialdom, which stands faithfully guarding their interests.

Bourgeois ideologists are trying to obscure the essential difference between the top managers and the rank-and-file engineers and technicians. They assert that in the course of the "revolution" managers, technical specialists and scientists acquire such a strong sense of "leadership" in industry that they constitute themselves into a new class, characterized by class consciousness, class interests and class privileges. Such an inference is obviously untenable.

The numerical growth of managers and technicians reaffirms that the social character of production is becoming more intensified. This growth is also conditioned by the requirements of modern productive forces and the level of their development. The number of technical specialists may grow and their role may be heightened, but they can never become a class. Managers, engineers and the technical intelligentsia in general were, and are, a segment that recruits its members from all classes of society. What chiefly distinguishes the technical intelligentsia from the capitalists is that it does not own the means of production, and is therefore a hired force. It also differs from the working class in that its work is not manual, but chiefly intellectual and therefore draws a higher pay. Moreover, its ranks are in a state of continuous differentiation. One part, practically speaking, cannot be distinguished from the capitalists. The other supplements the army of unemployed and is closer in status to the proletariat. The technical intelligentsia cannot act as an independent force. It can only be an ally, an auxiliary force that supports either the old ruling class, or the new class rising to power.

Capitalism will not be eradicated by the managers and organizers of production, not by the technical intelligentsia. It will be overthrown by the working class, led by a revolutionary party, a party capable of instilling socialist

consciousness in the proletariat and of guiding it toward the definite goal of socialist revolution. The better part of the bourgeois technical intelligentsia will find its place in a socialist society. It can overcome prejudice and accept the prospect of a socialist reorganization of society, for it has been proven that this reorganization can be carried out without the bloodshed and chaos which in its view are usually associated with every revolution. The objective conditions for the union of the technical intelligentsia and the working class against big monopoly capital are better now than ever before. Only devotion to the working class holds out the prospect of free, creative labor to the technical intelligentsia.

The growth of the force of engineers and technicians in the socialist countries is a law of socialist development and does not imply the establishment of a "technocracy." The experience of communist construction in the Soviet Union has already brought up the question of raising the stature of the working class and peasantry to that of the engineers and technicians. So what is all this talk about the rule of "technocrats" in the USSR? The Soviet Union already ranks first in the world in the training of engineers and technicians. By the end of the seven-year plan period the overwhelming majority of the population in the USSR will have had a secondary or higher education.

When they speak of the main features of a "managerial society" bourgeois ideologists reveal a complete inability to understand the innermost processes governing the development of the modern capitalist economy. They scan the surface and see only the external aspects of the new factors and phenomena that accompanied the development of capitalism into imperialism, make a fetish of them and, in consequence, attribute substance to what is only appearance. Actually, all these new factors and phenomena, as noted before, do not attest to the emergence of a "managerial society," but to the maturing within the framework of capitalism of the material conditions for its replacement by socialism. V. I. Lenin pointed out more than once that the high level of socialization of industry, as well as some of the agencies of assessment and control developed by the capitalists, are of great significance for the building of socialism. In order to make use of them, there would have to be a socialist revolution, because until then, so long as the means of production remain in the hands of private owners, the state, as an embodiment of the dictatorship of the financial oligarchy, will direct all its activities in the interests of the monopolies, and not of the people. Only a socialist revolution can transform the material conditions created by capitalism into a real basis on which to build socialism.

Hence, state monopoly capitalism, so idealized by the ideologists of technocracy, is not a "managerial society" but, as Lenin wrote, "a thorough material preparation for socialism, the threshold of socialism, the step of the historical ladder between which (step) and the step called socialism, there are no intermediate steps" (Collected Works, Vol. 25, p. 333). Socialism, and not the mythical "managerial society," is the alternative to capitalism.

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The "technocratic" ideology is a bourgeois ideology during the period of the general crisis of capitalism. Under the banner of the "managerial society" bourgeois sociologists idealize the principal features of imperialism and try to discredit the Marxist-Leninist doctrine regarding the inevitable doom of capitalism and the triumph of communism.

The ideologists of "technocracy" unwittingly expose the purpose of their theories themselves. This appears most clearly in Veblen's "The Engineers and the Price System," in which the author concludes: "The purpose of this memorandum is to show objectively that in present circumstances there are no grounds for fear, nor is there any hope for an effective revolutionary upheaval in America that would displace the established order and eliminate the private interests which now control the nation's industrial system" (T. Veblen, "The Engineers and the Price System," New York, 1936, p. 138).

The attempt to justify and defend the basic features of state monopoly capitalism lies at the bottom of the clearly expressed class nature of the "managerial revolution" concept. But despite all the theorizing by the apologists of capitalism, the course of social development throughout the world bears witness, more than ever, to the approaching victory of communism.

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S. STRUMILIN (Continued From Page 8)

It is not surprising that the law of value, placed in the service of socialism, is acquiring ever growing importance at the present stage in the Soviet economy, and is penetrating ever deeper and further and becoming rooted in all sectors and branches of our economic front and above all in the decisive sector where production and labor proportions are established by plan. It is not accidental that the State Planning Committee has as one of its most important tasks that of conducting a ceaseless struggle against disproportions in production. This means that the efficacy of the law of value becomes much greater as compared with its spontaneous manifestations under capitalism. Convincing proof of this is contained in the fact that in contrast to the capitalist countries where spontaneity alone still serves as a regulator of proportions, our country is completely free from staggering crises.

Literature Cited

(1) Karl Marx, Capital, Vol. I, 1954, p. 83.
(2) Ibid., p. 78. (Italics by S. S.)
(3) Ibid., p. 83. (Italics by S. S.)
(4) Marx and Engels Archive, Vol. IV, p. 119. (Italics by S.S.)
(5) K. Marx, Capital, Vol. III, p. 865. (Italics by S. S.)
(6) In this, its latest modification, the law of "economy of time" operates as a new, socialist law, the law of planned, proportional development of the national economy. This new modification lends the old law a new form.
(7) K. Marx, Capital, Vol. I, p. 85. (Italics by S. S.)

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L. Bagramov:

Cadres in Economic Competition : the Lag of the U.S.A. is Growing

The political dictionary of the American bourgeois press has become richer by the addition of a new and somewhat unusual combination of words, namely, Educational Pearl Harbor. It originated in connection with the serious crisis the system of education and training of qualified technical personnel is now undergoing in the United States and the outstanding achievements of the Soviet Union in this field.

At first by no means everybody admitted the Soviet achievements; many bourgeois political and public leaders could not admit the thought that the USSR, where before the revolution three-quarters of the population were illiterate, could in a brief span of time create a mighty army of highly-competent specialists. Even when the sensational reports that the USSR was annually graduating more engineers than the United States appeared in the Western press, the dyed-in-the-wool bourgeois leaders continued nursing their illusions of the unshakable American "technical superiority."

It was only after October 4, 1957 that their eyes were opened. The "beep-beep" of the Soviet sputnik, the world's first artificial earth satellite, came like a bolt from the blue not only to the politicians possessed with the idea of "Russian backwardness," but also to the millions of plain Americans to whom objective information about the Soviet Union is inaccessible.

Today no one any longer dares question the standard of training of Soviet specialists. The Soviet "challenge" in the sphere of education has become a subject of endless discussions in Congress, scientific and technical associations, at special conferences on education and at exclusive meetings of various business groups. Many experts were given the task of learning the "secret" of the Soviet Union's achievements in preparing professional personnel with a view to "catching up with the Russians," to make up for lost time. For the first time in the history of the United States, Congress passed a federal law providing for aid to education.

The bourgeoisie's alarm is understandable: the field of education and training of competent professionals, a field in which the Soviet Union has made colossal progress, is one of the major sectors of economic competition between socialism and capitalism.

"Leap From Illiteracy to Sputniks"

Today the USSR is unequalled by capitalist countries in the rate of training technical specialists. The following table shows the dynamics of turning out engineers in the Soviet Union and the United States of America.

Table I

Engineers Graduated in USSR and USA
(in thousands) (1)

	1950	1951	1952	1953	1954	1955	1956	1957	1958
USSR	36	44	47	46	56	66	71	83	94
USA	53	42	30	24	22	22	26	31	35

Thus, while in the Soviet Union the number of engineers graduated increased 2.6 times between 1950 and 1958, in the United States it decreased by one-third in the same period. In 1958 the USSR turned out 2.7 times as many engineers as the United States, and today the USSR trains considerably more than the United States, Britain, the Federal German Republic and France put together. (2)

The rapid rate of training highly-qualified technical personnel in the USSR has been helping our country to outstrip the United States in more and more fields, including the total number of specialists employed in the national economy. (See Table II on the following page.)

According to data published by the American Joint Council of Engineers, the total number of engineers in the US economy in 1957 was 600,000-700,000, of whom only 75% had diplomas. (4) Moreover, according to "Fortune" very many engineers in the United States are not working at their specialty directly: because of the low salary they quit work in their special field, taking positions in business or administrative posts. (5)

No less striking are the Soviet Union's accomplishments in training technicians — that highly important section of personnel employed in the national economy. In 1957 our country's secondary schools turned out 205,000 specialists in industry, construction, transport and communications. Unfortunately American literature does not give generalized data on the preparation of junior technical personnel in the United States. The Monthly Labor Review published by the US Department of Labor estimates that secondary technical schools of the USSR graduate annually at least nine times as many technicians as the American two-year course "technical institutes," which come closest to them in scope of study. (6) The magazine says that the Soviet engineers and scientists have a considerably greater number of

Table II

Number of Engineers Employed in the USSR and USA Economies (3)
(in thousands)

	1940	1950	1953	1954	1956	1957
USSR	290	392	481	530	721	816
USA	156	316	361	371	400	—

qualified assistants than their colleagues in the West; this frees the Soviet specialists of the highest qualification from auxiliary operations and permits them to concentrate their efforts on the main tasks.

What are the reasons for the outstanding achievements of the Soviet Union in education and the training of highly qualified specialists? Where are the roots of the vast cultural and technical progress of the USSR, which the Greek journalist Dzamuranis called a "leap from illiteracy to sputniks?"

The bourgeois leaders who "discovered" our country only since the launching of the Soviet sputniks avoid answering this question. The more sober-minded leaders of the West have taken due notice of a number of specific features characterizing the system of education of the USSR and the part it plays in the affairs of Soviet society. The chief specific features are the following:

(1) The Soviet state attaches extreme importance to education, allotting vast sums for the building of schools, technical high schools and colleges, for the material security of students, for the training and pay of qualified instructors, and for supplying the educational establishments with the latest laboratory equipment, and so on.

Harlan Hatcher, President of the University of Michigan, who headed a delegation of American educational leaders visiting the USSR, said that it was next to impossible to visit the Soviet Union and fail to be highly impressed and even awed by the support this country is giving to education. He underscored that the Soviet Union allocates 2.5 times as much money (excluding the allotment for medical education) as the United States does (including medical education); that professors and other university instructors are highly paid; that 80% of Soviet university students receive scholarships and enjoy other benefits, and that each year sees the number of scientists increasing, with most of these people remaining in the system of education.

(2) Owing to all-round support given by the state — free tuition, the system of state scholarships, provision of hostels for the students, and so on — education, including higher education, is accessible in the USSR to the broad masses.

At a meeting of the European Council devoted to a discussion of the "crisis of scientific research in Europe," Karl Lugmeier, ex-president of Austria's Federal Council, stated that in the USSR students get material assistance from the state and enjoy all conditions that are conducive to study. "There is no need for me to add," Lugmeier said, "that this would be a good example for us to follow."

(3) The USSR has no racial or national barriers to education and women enjoy equal opportunities with men in receiving an education and choosing a profession. This was mentioned in particular by Harlan Smith of Yale University; he said that the Russians were trying to achieve 100% selection and employment of the most talented from among the country's total population. (7)

(4) The Soviet Union has no teacher-shortage problem in schools or colleges. The standard of training teachers is high and the profession is one of the most respected in society. This will be found in the special report on Education in the USSR prepared by the U.S. Office of Education after a two-year study of the question. (8)

(5) The students of the Soviet general schools and technical colleges receive a considerably better preparation in mathematics and natural science than the students of the West.

"I know of no school in the United States where a pupil gets such an all-round education and training in the exact sciences as in Russia, even if he were preparing to become an Einstein or Edison, a Fermi or Bell," Lewis Strauss, former chairman of the Congressional Committee on Atomic Energy, said. (9)

Eleanor Lowman, author of the above-mentioned report on education in the USSR, came to the conclusion that the graduate of a Soviet technical college is better prepared in mathematics than a Doctor of Mathematics in the United States. (10)

(6) Characteristic of Soviet people is an immense craving for education, science and culture.

"The changes in Russia — the spiritual uplift, the people's great interest in science and technology, the vast thirst for knowledge in all directions — may be called spiritual industrialization," the Greek journalist Dzamuranis wrote.

After his visit to the USSR William R. Hearst, Jr., owner and editor of the Hearst newspapers, had to admit that everybody in the Soviet Union was acquiring a higher education. The interest displayed in higher education by the masses in the USSR is as great as the interest displayed in sports, fashions and finance in other countries.

Giving the Soviet system of education its proper due, the bourgeois leaders, of course, are far from regarding this as a manifestation of the superiority of the socialist system. They will not admit that it is precisely socialism which for the first time in the history of humanity has opened up the doors to education to the broadest sections of the working masses. And yet this is the whole point.

Socialism does not merely proclaim the right of education for all; it also ensures it by providing the material requirements. By affirming the ideology of national equality and friendship of the peoples, socialism has drawn into the cultural revolution the national minorities, whom capitalism has used all means to debar from education. By emancipating women socialism has given them the opportunity of fully developing their talents and abilities, to show their worth in fields which "public opinion" in capitalist countries regards as the monopoly of men.

The immense possibilities for spiritual uplift of the masses of the people inherent in socialism serve as a powerful magnetic force for the working people of capitalist countries. That is why the ideologists of imperialism try to distort the aims and substance of the Soviet system of

education and thereby to detract from its indisputable achievements.

We have already shown up the slanderous assertions of bourgeois propaganda that the Soviet Union trains technical specialists for carrying out its allegedly expansionist aims, and that its success in preparing technical personnel is attained at the expense of the humanities, art and general culture. (11)

Another "charge" the bourgeois press has made against the Soviet system of education is that it engages in the ideological education of the youth. For instance, Nicholas De Witt, of the staff of the Russian Research Center at Harvard Univeristy, author of a special study on the training of professional people in the USSR, has asserted that education in the United States keeps shy of politics, and he does not hide his displeasure that "Communist education does not confine itself to teaching but in addition fully encompasses building the character of the individual and shaping his views, feelings and ideas." (12)

Yes, Mr. De Witt, our schools not merely give students profound knowledge but are also engaged in the ideological education of the students, inculcating in them the lofty principles of communist morality, love for their country and proletarian internationalism, and a conscientious, communist attitude towards work. We regard this not as a defect of the Soviet schools, but as their great merit. Well, Mr. De Witt, and what do your schools do? Are they insulated against your bourgeois morality, the corrupting influence of your culture? Do they not try to instill in the pupils the spirit of "free enterprise," faith in the "almighty" dollar? And is it not true that your schools have produced the standard-bearers of jim-crowism of today, and the thugs of Little Rock, who have discredited the United States before the whole world? However much the lackeys of the monopolies may dodge, they are powerless to disprove Lenin's thesis that the bourgeois school is nothing more than a weapon of the class rule of the capitalists, that "a school divorced from practical life or politics is a lie and a piece of hypocrisy." (13)

The reorganization of the educational system in the Soviet Union has evoked a fresh wave of slanderous inventions by the bourgeois press. The Swedish newspaper Morgen-Tidningen has called the reform of education in the USSR a step backward, "drastic measures for the curtailment of education," and the French Catholic newspaper Croix has even advanced an ideological basis for such a definition: in its view the purpose of this reform is to cut down the number of thinking people as "nothing is as dangerous for the communist system as youth which reasons, criticizes and seeks the meaning of life."

It is difficult to say what Croix was driving at by resorting to such absurd arguments, but one thing is clear: only a pathological hatred for the Soviet Union, socialism and communism could explain such malicious assertions.

To show that Croix's arguments are unfounded it is necessary only to ask the following question: If thinking, educated persons are dangerous for the communist system, why then has the Communist Party of the Soviet Union conducted a tireless struggle for the education of the broadest masses from the earliest days of the Soviet power?

"Youth which reasons and criticizes" is the most valuable possession of the Soviet people, for the building of socialism and communism presupposes conscious activity by millions of people who have mastered science and technology; it also presupposes criticism and self-criticism, without which the forward movement of our society is inconceivable. Such a youth is really dangerous, but not for the communist system; it is dangerous for the capitalist system, whose prestige Croix is vainly trying to restore by means of peremptory anti-Soviet arguments.

Anyone who takes the trouble to study objectively the reasons for the reorganization of the system of public education in the Soviet Union will inevitably arrive at conclusions which have nothing in common with the conclusions of Morgen-Tidningen, Croix and others like them. He would be persuaded above all that the seven-year plan of development of the Soviet national economy envisages no curtailment but expansion of the training of specialists in all spheres, including specialists with a higher education. Furthermore, he could not fail to arrive at the conclusion that the educational reform is dictated by the requirements of the building of communism in our country, the need for bringing the schools closer to life, for efficient labor. Finally, it would be hard for him not to agree that the reform does not make for the deterioration but for the improvement of teaching in the secondary and higher schools making fullest use of the latest achievements of science and technology. (14)

It should be noted that the attempts to belittle the present achievements of public education in the USSR and to give a distorted view of the brilliant prospects in this sphere have less and less chance for success in the capitalist countries themselves. So great are the accomplishments of the Soviet Union in the education of the broad masses and preparation of qualified specialists, and so impressive is their effect on highly diverse sections of the population in bourgeois countries, that even loyal bourgeois are not prone to nurse illusions based on "flaws" in the Soviet educational system. Many bourgeois leaders have recommended to the West that it apply the "Soviet experiment" in the sphere of education "before it is too late." "I would like to see us borrow from the Russians the vigorous efforts and support envisaged in their system of education," Dr. Lawrence Derthick, head of the U.S. Office of Education, who has visited the USSR, said at a conference on higher education in Chicago. (15)

Like many American political and other public figures Dr. Derthick has said that the USSR has hurled a "challenge" in the sphere of education.

However, let us see how well the United States is prepared to take up the Soviet Union's "challenge."

Education in the United States:

(a) The Crisis Continues

The Christian Science Monitor wrote in November 1957 that the launching of the two Soviet sputniks while the United States remained bound to the earth as before symbolized the importance of highly qualified personnel for maintaining the existence of the United States as a nation. Washington, it continued, had awakened, and a beginning had been made for a rebirth and revolution in the sphere of education.

This and similar statements made by the American bourgeois press proved to be a propagandist bluff. The events which have taken place in the United States since the first brilliant achievements of the Soviet Union in the study of outer space give no basis for speaking of any substantial, and particularly "revolutionary," changes in the American educational system.

Facts have shown that the American system of education in general, and the system of training engineers and technicians in particular, are far from experiencing a rebirth today; they are in a state of deep crisis, as they were before the launching of the Soviet sputniks. More, according to Dr. James Killian, Assistant to the President for

cience and Technology, "despite the challenge hurled by oviet science the situation in some fields of American edu- ation has become worse." Today the United States is faced y the same problems which have been awaiting solution for good many years.

(b) The Problem of Financing

This problem is the Achilles' heel of the whole system of ducation in the United States. The crux of the problem is ot merely that the money allotted for education is insuffi- ient to meet the growing needs, but that the very structure f financing education is imperfect and archaic, serving the elfish interests of the bourgeoisie and inflicting tangible arm to the American nation as a whole.

For many decades the situation has existed in the United tates under which education is financed almost entirely rom the revenue of the local communities and the states, hich manage all the affairs of public education. (16) Of all he money at the disposal of the elementary and secondary schools in the 1957-1958 school year federal appropriations made up a mere 4%, while allocations from states and local communities came to 41% and 55% respectively. (17) Total outlay on education in the United States in the 1957-1958 school year, including higher education, was 14 billion dollars.

Money allocated to meet the needs of state colleges and universities also came chiefly from the budgets of states and local communities. (18) According to data of the National Education Association, of the $891 paid in federal taxes by each American having an income of $5,000 a year, $444 goes to the Department of Defense and only $4.7 (1/95th of the amount) goes "to help develop and assist" elementary, secondary and higher education. (19)

The following table gives an idea of the proportion of expenses on education of the total amount of disbursement of the Federal budget. (20)

Thus, expenditures on education in recent years have been a little more than 0.4%, or 1/250th, of the total expenditures of the federal government.

Table III

	Fiscal Years				
	1954-1955	1955-1956	1956-1957	1957-1958	1958-1959*
			(in billion dollars)		
Total budgetary outlays	64.57	66.54	69.43	71.94	53.01
of which:					
Outlays on education	0.32	0.28	0.29	0.31	0.21
Percent of total	0.5	0.42	0.42	0.43	0.40

* up to February 1959.

But, perhaps, the financial condition of the states and counties is sufficiently strong to enable them to finance education without federal assistance? The facts show the very opposite. In the past ten years the combined debt of the states and local organs of government have risen 182%, (21) and the indebtedness of the municipalities and other local communities, which furnish the bulk of the money for financing education, has increased from $13.5 billion in 1946 to $33.1 billion in 1955, or 2.5 times.

The main revenue item of local budgets is the property tax, which, according to The New York Times Magazine, runs up against "extremely stubborn and thoroughly organized resistance." (22) Under such circumstances a decision taken on such a question as the building of new schools, for instance, could be sabotaged by landlords refusing to pay the tax. (23)

The situation in which education is found in the United States serves as a striking illustration of what Lenin said about bourgeois states, which in order to maintain the rule of the capitalist class take the largest chunk for the army and similar purposes, leaving pennies to spend on culture. "In every bourgeois country," Lenin wrote, "municipal revenue is such as the bourgeois central government is willing to give away for cultural needs, as this income is secondary, the collective of such revenue is inconvenient for the central authorities, and the main, fundamental and basic requirements of the bourgeoisie and bourgeois rule are already ensured by the large chunk. (24)

The American bourgeois press lavishes a great many fine words in praise of Big Business, which, it alleges, gives disinterested assistance to education. However, when General Motors or the Du Ponts appear in the role of philanthropists they pursue a very definite aim, namely, to keep a particular educational establishment under their influence. Nor should one suppose that the monopolies are making substantial sacrifices: according to data published by the magazine Fortune, only 14 of the big corporations give more than 1% of their profits to subsidize education. The rest give much less. (25)

Finally, it should be borne in mind that Big Capital's "gifts," which in the main go to private schools, private colleges and universities, are quite insufficient for solving the problem of financing education. The society of businessmen "has not yet realized its role as philanthropists," Mr. D. Josephs, president of the New York Life Insurance Company and former chairman of the President's Commission on Education, has tactfully said. (26)

The cry for regular and effective aid to public education is growing in the USA, assailing the federal government, which collects the lion's share of taxes from the population.

However, such appeals evoke no enthusiasm in Washington. Washington pleads that it has no money and that the government debt has reached a figure that is unparalleled in American history. Moreover, sticking to the rule of keeping up "good form," they do not speak of the main thing namely, that the government debt has risen above all as a result of the unchecked armaments race and that by cutting down the vast military expenditures money could be released also for financing education and for meeting other urgent needs of the American people. The US ruling circles worry least about these needs. They are generous, highly generous, in signing contracts with the monopolists,

who make immense fortunes on military deliveries. They are like Shakespeare's Shylock, when it comes to the interests of the broad working masses.

(c) Crisis of the School System

The New York Times Magazine reported in January 1959 that the United States was short of 142,000 classrooms, as a result of which almost 2 million pupils have proved to be "superfluous." (28) The country is experiencing an acute shortage of school teachers, the standard of preparation of many teachers is extremely low and classes are overcrowded. "The only thing the American schools have plenty of is pupils," wrote the bourgeois magazine Life. "There are not enough schools or teachers... The schools have been overcrowded for years. Children still study in hovels, corridors or school buildings put up in a hurry... Most teachers get extremely low pay and some of them are not worth even the money they are paid."

Despite the sharp criticism levelled in recent years at the Dewey-Kilpatrick pedagogical system (according to the system of "progressive education" advanced by them, the object of teaching is not to give the school children profound and systematic knowledge, but to teach them "to adjust themselves to life"), the state of affairs in this sphere remains practically unchanged. Many U.S. educational leaders have pointed out that the American school system not only does not give pupils the needed knowledge, but it kills whatever desire they may have to broaden their outlook, corrupts their minds and does not accustom them to persistent and regular labor.

"The tragedy of the American system of education," Dr. Samuel Gould, President of Antioch College in Ohio, said, "is that as the child is promoted from one class to the next in our schools his inquisitiveness and desire to learn the unknown are somewhat dulled. It is only in rare cases that the system of training pursues the aim of developing the mind to serve as an active creative instrument, ennobling the person." (29)

Of course, serious flaws in the education and training of children in American schools are to be explained not alone and not so much by the system of progressive education. The reason for them lies far deeper, above all in the corrupting influence of the "American way of life" on the school. Highly indicative in this respect is a letter from a certain Patrick Hardy of Philadelphia printed by The New York Herald Tribune and Wall Street Journal. "In America," he wrote, "education is acquired mainly outside the classroom. You must blame the companies putting out gramophone records which reproduce the hysterical wails of Elvis Presley, or the Hollywood cynics for the flood of pictures depicting every kind of horror and monstrosity, or our publishing houses who turn out magazines like Confidential... and only then blame the persecuted teacher for trying to instill in his pupils' minds the idea that they are members of human society when the advertising tycoons of the amusement world demoralize them outside the classroom."

(d) Obstacles to Higher Education

"American public education is the most democratic in the world. It affords everyone in society equal opportunities for acquiring knowledge." (30)

This is the assertion of the American newspaperwoman Helen Shaffer, as it is of all official propaganda. But here is what the facts tell us.

The cost of education in U.S. colleges and universities has doubled since 1940. In 1958 it averaged $1,500 a year in a state college and $2,000 in a private college. (31) A study made at the end of 1958 by the magazine United States News and World Report has shown that of 189 colleges 109 had raised tuition fees for the 1958-1959 academic year, and many of them had also raised the rent for student accommodations, food, and so on. (32)

Yet no more than 20% of American students receive scholarships from funds of colleges, public or private organizations. The average scholarship, according to the U.S. Office of Education, is approximately $277 a year, (33) in other words, the scholarship covers only an insignificant part of the cost of education. The New York Times predicts that judging by the rate of increase the cost of education will double by 1970.

The bulk of students in the United States are compelled to earn extra money in their spare time. However, such extra earnings are, as a rule, far from enough to cover expenses connected with studying in a college. (34)

In describing the dilemma American students are faced with due to the high cost of education, School Life, official organ of the US Office of Education, has written: "Even should they work a full working day during the summer and part time during the academic year, many college students will be unable to earn enough to cover these expenses... The figures show that only half of the top quarter of the high-school graduates enter college and that half of those actually graduate. There can be no doubt that the financial need is one of the major factors in their leaving college." (35)

Obviously under such conditions it is only the sons and daughters of the propertied classes that, in the main, can obtain a higher education in the United States.

However, there are other obstacles to education in the United States, besides class barriers. In a special report on education prepared by the Rockefeller Brothers Foundation it is admitted that Negroes in the United States have limited opportunities for obtaining an education and acquiring a profession. According to the American 1950 census data there were 300 white engineers for every Negro engineer. This means that the proportion of engineers among Negroes (who make up 10% of the country's population) is 1/30th of that of whites.

In one of its issues in 1958 the Journal of Engineering Education published an article dealing with 19 of the larger American manufacturing companies each employing more than 26,000 engineers; this study showed that the number of Negro engineers working for these companies ranged from 40 to 65, or 1/500th of the number of white engineers. (36)

Today public leaders in the United States are also taking notice of the fact that many talents "are lost" due to the deep-rooted scornful attitude towards women choosing the profession of engineer or scientist. According to data published by the National Science Foundation, of every 100 scientists and engineers in the United States there are only 8 women. Women make up but 2% of American physicists, 3% of geologists and 3% of meteorologists, 5% of the doctors, some 7% of chemists, 8% of biologists, and less than 10% of mathematicians. The number of women among engineers is trifling — some 3 for every thousand.

Betty Lou Raskin, one of the few American women engineers, said bitterly that she was the only woman among the 2,000 people who attended the national technical conference of the Society of Plastics Industry Engineers. "Such a conference in Russia," she said, "would have brought out more than 600 women."

Today, in face of the magnificent achievements of the USSR in training highly qualified personnel and the lag of

ıe United States in this sphere, even the press subsidized y the monopolies laments the fact that because of racial nd national discrimination and the actual inequal status of omen, the United States is not making use of the potentials ut into action by the Soviet Union. However, this very ress, in obedience to the social mandate of the monopolies, s fanning racial hatred in order to poison the mind of the orking people and hinder their unity in the struggle for ıeir class interests. Persistently and systematically, day ı and day out working on the psychology of millions of mericans and shaping their tastes and habits, this press as created an attitude towards women as lower being hose interests are confined to the little world of the home nd who is incapable of engaging in intellectual pursuits. 37)

(e) The Teacher Shortage

"The most crucial weak point in the development and improvement of education in the Unites States is the growing hortage of qualified teachers... Our nation, like the extravgant farmer, uses grain needed for future crops," says, n its report to President Eisenhower, the President's Comnittee on Education, which regretfully states that many apable Americans prefer working for private firms to teachng in school or college. (38)

According to data published by School Life, the United States is short of 132,000 elementary and high school teachers. (39) The shortage of professors and qualified instructors is the most acute problem facing American colleges and universities, a problem which the Special Committee engaged in its study predicts will not be solved within he next decade. (40)

The situation in the sphere under review is aggravated by he fact that the training of a large number of teachers now employed in schools and in colleges does not meet essenial requirements. According to National Education Associaion data, 80,000 American school teachers do not have adequate preparation, as a result of which "hundreds of thousands of American children lack competent instruction." (41) The special report of the Rockefeller Brothers Foundaion also points out that the standard of preparation of teachers is inadequate and that there exists in the United States "a real crisis in the teaching of natural science."

The shortage of teachers in the United States in general and of qualified teachers in particular is to be explained by material as well as ideological or moral reasons.

A study made by the U.S. Office of Education has shown that school teachers, on graduating from college, get on the average $3,600 a year, and in some areas less than $2,500. (42) Under the Heller budget a family of four needs approximately $6,000 a year for a modest living. According to estimates by the council on financial aid of education, the real salaries of teachers in the Unites States at the present time are 30% lower than they were in 1940. (43) The President's Committee on Education mentioned above holds that to ensure professors and instructors at colleges and universities the required living standard their salaries should be raised 75% to 80%. (44)

The American press writes alarmingly that in view of the low salaries tens of thousands of teachers give up school or college and go to work for industry or commercial firms. School and Society, referring to the results of a poll taken by the Office of Education, has reported that approximately half the teachers who began to teach in 1956 will quit teaching and 86% of the women teachers polled stated that sooner or later they would take up another profession. (45)

Many teachers give as the reason for going to work in industry that colleges and universities do not have money and laboratory equipment needed for research purposes.

As to the ideological, or moral aspect of the question, it consists in the extremely low prestige of a teacher in American society. The thing is that the prestige created by any profession in bourgeois society depends above all on how much the profession pays. According to the prevailing viewpoint in the Unites States, "success" is measured only in dollars, so that a teacher earning little money is regarded as a "failure," one who cannot win success in other fields and is therefore compelled to take up teaching.

Paul Reinert, President of St. Louis University, said at a conference of representatives of colleges and industry held early last year that a college teacher does not enjoy "proper respect, support, security and understanding of the value of his work" in American society. "We believe," he went on to say, "that the roots of this problem lie deep in our social system." (46)

(f) Anti-Intellectualism

The problem dealt with by Reinert is a part of a far broader and more acute problem. It involves the scornful attitude towards mental work in general, an attitude which is widely prevalent in the United States and which is claimed to be an inherent attribute of 100-percent Americanism. In the course of many years all media of American propaganda — literature, the radio, motion pictures and TV — have been spreading in every possible way the cult of the knights of business and easy money, and have cast among the broad masses the seeds of distrust and suspicion towards people engaged in mental labor, and particularly towards those who have devoted themselves to science. Scientists and teachers became a regular object of gibes by the yellow press, the comics and similar pulp literature. They were among the first victims of the campaigns to combat the "subversive elements." (47)

Louis Wright, Director of the Folger Library, has characterized this peculiar process of "reappraisal of values," which American society has gone through in the past decades, in the following words: "Americans have been taught to regard scientists as undesirable citizens who are unadjusted to life in a society of good fellows. We picture professors as caricatures, either as comic individuals wearing raincoats and berets, or as weak and barren, or as out-and-out scoundrels planning to set fire to the capitol and overthrow the republic. We have tormented them by orders which would disgrace even a police state. We have invented the term of egghead, which expresses scorn for any thinking person whose vocabulary is not confined to that used in the sports columns or the adventures of Li'l Abner (48), and at the same time we have proclaimed a blockhead our model of perfection." (49)

The seeds planted by American propaganda have yielded abundant shoots. Even highly conservative bourgeois leaders of the United States speak with unconcealed alarm of the ulcer of anti-intellectualism, which is corroding American society, as one of the most serious obstacles to the development of education in the United States.

The widespread attack on reason in the United States reflects the deeply anti-social and arch-reactionary essence of the capitalist system today.

There was a time when the rising bourgeois class opposed feudal obscurantism and endeavored to instill in the broad masses faith in the triumph of human genius. That time has gone never to return. Today the bourgeoisie has thrown the banner of reason overboard. Endeavoring to delay its inevitable exit from the historical scene, it preaches

intellectual isolation, disbelief in the creative potential of man and disdain for his lofty ideals and aspirations. This is the root of one of the main reasons for the crisis the American system of education in general and of training specialists in particular is now going through.

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The bourgeoisie is not interested in bringing knowledge within the reach of the broad masses. More, it is afraid of the education of the working people because education becomes a weapon in their struggle against the yoke of capitalism.

However, technical progress has made necessary a certain educational standard for the workers. "After all, the bourgeoisie must have trained workers capable of applying themselves to the high standard of technology," Lenin wrote. (50) On the other hand, the struggle waged by the working people in capitalist countries for their social rights compels the ruling classes to make concessions. One of the major democratic gains of the American people is the right to universal free secondary education.

Forced to introduce universal secondary education in the United States, the American bourgeoisie has, however, done its utmost to turn it into an instrument of its rule, to reduce schooling to training "obedient and efficient servants" (Lenin), affording working people the opportunity of acquiring merely the educational minimum needed for performing the functions of wage slaves in contemporary capitalist production. Higher education in the United States is outside the reach of the working masses, remaining as before the monopoly of the propertied. In describing education in the United States, Ben Morreel, head of an American steel company, said in a speech delivered at Columbia University that the system of education in his country gives rise to a "race of intellectual pygmies," training the youth for life in a society "which is managed by a small group of intellectual elite." (51)

Even today, in the period of sharp crisis in the training of engineering and scientific personnel in the United States, School and Society believes that tuition fees in state colleges and universities should be "substantially raised." (52)

Thus, the ruling circles of the United States are today confronted by an insoluble dilemma. On the one hand, they recognize that scientific and technical progress, on which the country's military-economic potential depends (and this is what they worry about most of all), requires a radical revision of the system of education, elimination of the monopoly in science and technology enjoyed by the property classes. On the other hand, they cannot and do not want to eliminate the class barriers to education, as that would mean undermining capitalism's social basis.

Reflecting this position, among other things, is a letter published by the New York Times, the writer of which underscores the fact that the American system of education serves the interests of the capitalist system in the United States. "We must," the author moralizes, "definitely ensure a condition such that in the event there are any changes, we should be certain that the changes do not conflict with the way of life in the United States of America. We must clearly see the tasks facing our country and our institutions."

This statement can serve as the key to an understanding of why the many projects for reforming the system of education in the United States are indefinite and putting them into effect runs up against insurmountable obstacles.

In January 1958 President Eisenhower sent Congress a special message in which he stated that in the interests of "national security" the federal government should take "urgent measures" in the field of education. Recommended in the message along with other measures was the institution of 10,000 federal four-year scholarships for able graduates of high schools who wish to enter college. Essentially what was contemplated was a subsidy to cover part of the tuition fee in American colleges. The bill introduced in Congress first provided for the establishment of 40,000 federal scholarships, but later, in the course of the discussion on it, the number was cut to 23,000, and, finally, to 10,000. The last proposal virtually meant that only one graduate of every two schools could count on assistance in paying the college tuition fee.

However, even this paltry measure was rejected by Congress. In the law on aid to education passed after long delays certain measures are envisaged to improve the teaching of mathematics, natural science and foreign languages and in training technicians and graduate students. But the law contains no word on scholarships. (53)

Instead of scholarships a fund of $295 million was set up (for four years) to be used for granting loans to students to be repaid by them with interest. Assuming that the average loan will come to $500 a year, it means that only one of every twenty students could avail himself of a loan. (54) In other words, a very small portion of the students could obtain loans. The U.S. Office of Education itself warned that since the amount made available to each college is limited in accordance with the law, it "can be quickly exhausted, at least in the larger institutions." (55)

Thus, the law left in effect the existing class principle obtaining in the United States, namely, that higher education can be acquired by one who has money. The law has not allocated a penny for building schools and raising teachers' salaries. The total amount appropriated under the law is altogether 2% of the direct military expenditures of the federal government.

It is indicative that the struggle conducted to pass the law proceeded under the slogan of "catching up with the Russians" in training enigineering and scientific personnel for the purpose of strengthening the United States' war potential. In his message to Congress on economic problems last year, Eisenhower pointed to the necessity of quickly expanding and improving the scientific programs and the country's system of education with a view to ensuring "permanent superiority of the free world's military-economic potential." (56) Lawrence Derthick, head of the U.S. Office of Education, expressed himself even more frankly on this score: "We simply cannot maintain or strengthen our position of leadership in the free world without extending and improving education." (57)

It is no accident that the above-mentioned federal law on aid to education has been officially called "a defense act." Commenting on the passage of the law The New York Post wrote: "Finally the federal law on education has been passed by Congress. Cut, mutilated and bled white, still it is a law. However, we have to thank the Russians that some kind of a law was passed at all."

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What are the prospects in the competition between the USSR and the USA in the training of technical specialists?

The target figures for the economic development of the USSR in 1959-1965 provide for a considerable extension in the training of personnel with a higher or special secondary education. In the current seven-year period higher educational establishments will graduate 2,300,000 specialists, among them roughly 880,000 engineers.

According to an estimate of the research and statistical service of the U.S. Office of Education, the United States will graduate in the same period altogether 316,000 engineers. (58) However, these estimates should be regarded

ritically. In the conditions of the anarchic capitalist economy real planning of training personnel is impossible. For instance, according to official data published in 1955 by the National Science Foundation, 30,000 engineers were to be graduated in 1956, and 34,000 in 1957. (59) Actually American colleges turned out 26,000 engineers in 1956 and 31,000 in 1957.

Early last year the research and statistical service of the Office of Education of the U.S. estimated that 78,000 students would enter technical faculties of American colleges in 1958, almost as many as did in 1957. Actually, however, life proved the estimates quite wrong: admissions to technical faculties in 1958 were 7.6% less than the year before. "This news proved a shock... in the light of the technical progress in Soviet Russia," wrote School and Society. (60)

Thus, if already today the USSR has considerably outstripped the United States in preparing personnel of the highest qualification, the gap will increase still more in the near future, with the Soviet Union forging further ahead.

Realization of this truth has frightened the advocates of capitalism. Alleging that the Soviet Union uses technical progress for economic expansion, the British bourgeois scientist Bowden once said: "The fate of the world may in the final analysis be decided by such institutions as the Bauman School (a famous engineering college in Moscow), rather than the hydrogen bomb."

The imperialists and their ideologists are afraid of peaceful economic competition with the Soviet Union. They well understand that the tens of thousands of technical specialists which our country's economy gets annually constitutes one of the major factors ensuring victory by the USSR in this competition.

Literature Cited

(1) USSR in Figures, Statistical Volume, Moscow, 1958, p. 359; Pravda, Part II, 1959; The New York Times, November 23, 1958.

(2) John Cockcroft, the eminent British scientist in the field of atomic energy, comparing the system of education in Britain with the "vast scale" of rearing specialists in the USSR, noted with regret that his country was training only 5,000 engineers a year. According to President Jacobson of the French Association of Engineers, his country turns out even fewer, namely, 4,500.

(3) USSR in Figures, Statistical Volume, Moscow, 1958, p. 359.

(4) There is reason to believe that this figure is somewhat overstated.

(5) Of the 20,000 engineers employed by General Electric only 55% are engaged in their specialties. See Fortune, December 1957, p. 151.

(6) Preparing technicians in the United States, besides technical institutes, are the so-called junior colleges, certain special technical high schools, army schools, and, finally, private concerns. The latter, according to Monthly Labor Review, are concerned merely with preparing specialists to perform certain limited functions, for which reason they do not give their students a general theoretical preparation. This leads to many technicians losing their job as well as their specialty as a result of curtailment of production or the introduction of technical innovations. The situation, the magazine points out, is different in the Soviet Union, where technicians trained in a comprehensive field are turned out in great numbers and "the authorities send students to areas where technical changes are contemplated in order to ensure the proper personnel for branches of industry which are developing new techniques." See Monthly Labor Review, January 1958.

(7) Yale Scientific Magazine, October 1958.

(8) See The New York Times, November 11, 1957.

(9) American Engineer, January 1957, p. 12.

(10) Keesing's Contemporary Archives, p. 16014. The standard of a Doctor's Thesis in the United States is somewhat higher than that of our thesis for a Candidate's degree.

(11) See Mirovaia Ekonomika i Mezhdunarodniye Otnosheniia, 1957, No. 4, pp. 132-134.

(12) Nicholas De Witt, Soviet Professional Manpower. Its Education, Training and Supply, Washington, 1955, pp. 1-2.

(13) V. I. Lenin, Collected Works, Russian edition, Vol. 28, p. 68.

(14) For example, the new programs for schools embracing the second stage of secondary education worked out by the Ministry of Public Education of the RSFSR and the Academy of Pedagogical Sciences of the RSFSR provide for extending the physics course to include atomic physics, supersonics, semi-conductors, the physical properties of plastics and their use in technology; the chemistry course will include acquainting the students with the properties of high-molecular compounds, their classification and active methods of synthesis. Much attention will be given to the study of plastics, artificial and synthetic fibers and rubber and the more typical processes of their industrial production. The biology course is closely linked with the development of agriculture and the latest accomplishments in agronomy and zootechnics. Compared with the ten-year schools the hours for the study of mathematics have been increased by 116, physics by 104, and chemistry by 67, and provision has also been made for raising the standard of education in the humanities, improving the study of history, geography and literature.

(15) The outstanding achievements of the USSR in all branches of the national economy, science, technology, education and art have aroused unprecedented interest in the capitalist world. The New York Times Magazine has estimated that around a quarter of a million Americans — "from government officials and scientists down to private citizens" — are today studying Russian. Thirty-two TV stations in the larger cities of the United States are giving lessons in Russian. Answering the question of why he is studying Russian one American student said: "We have to look ahead. Soon Russian will be the main language of science."

(16) The office of Education of the U.S. Department of Health, Education and Welfare does not manage the affairs of public education; it merely collects and publishes statistical data. All matters connected with education are referred by the office to the states, which in their turn charge the local communities with handling the affairs of the schools, and the local communities refer them to the so-called districts. The citizens of each district elect the school board, which, as a rule, is made up of the leading influential bourgeoisie, who thus are able completely to control school instruction. This kind of decentralization gives rise to an incredible lack of coordination in the system of education. Each state has its own sources of revenue and its laws covering schools, its teaching programs and its requirements of teachers.

(17) The Congressional Digest, August-September 1958, p. 195.

(18) Most of the higher educational establishments in the United States (two-thirds) are private institutions. The source of income of state colleges and universities is tuition fees paid by students (approximately one-half of the money) and appropriations by states and local communities. Subsidies by the federal government are negligible.

(Continued on Page 80)

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A. Shlikhter:

Some Questions of the Competition Between the USSR and the USA in Agriculture

One of the most important aspects of the solution of the chief economic task of the USSR is the economic competition between socialism and capitalism in the field of agricultural production and the surpassing of the foremost capitalist lands in per capita production. The outstanding significance of the "agricultural side" of the competition between the two systems is determined primarily by the exceptional role agriculture plays in creating an abundance of food, clothing, and other consumer goods. True, as a result of the tremendous achievements of chemistry in the field of synthetic products this role of agriculture has considerably diminished today. By producing synthetic materials chemistry makes it possible to create an abundance of clothing and footwear much more quickly, and by broadly substituting synthetic products for food products in industrial production we can achieve an abundance of many foods in much less time, and this applies also to products whose production formerly depended entirely on agriculture (perfumeries, etc.). But despite all the achievements of chemistry, it is the level of agricultural production which will, in many respects, determine the groundwork for the material well-being of people today and, seemingly, in the near future as well.

However, the significance of agriculture in the competition between socialism and capitalism is by no means restricted to its role in the production of material values. The question of the fate of the peasantry, who constitute the larger part of mankind, is inseparably connected with the state of agriculture.

Capitalism has shown, through countless illustrations, that the rise in agricultural production and the progress of agricultural technique are achieved through the impoverishment and ruination of ever larger numbers of the working peasants. In spite of the tremendous diversity in the conditions that exist in various countries, in spite of the extremely profound differences between the colonial countries and the metropolitan powers, between the more highly developed and the lesser developed capitalist countries, the inevitable result of every step taken by capitalist agriculture along the path of technical progress, the development of productive forces, and the rise in output is the ruination of ever more strata of working peasants and the ever greater subordination of peasant farming to the capitalist, bank, industrial and other monopolies.

Having effected the Leninist cooperative plan, the Soviet Union and the other countries of the socialist camp have proven the advantages of the socialist path of development of productive forces in agriculture, a path which, in contrast to the capitalistic, is accompanied by a general upsurge in the material and cultural well-being of the entire working peasantry. The victory in economic competition will prove the ability of the socialist system to ensure the flourishing of agriculture, an achievement beyond the means of capitalism, and it will create the material basis for accelerating the process of eradicating the essential differences between town and countryside. Hence the solution of the chief economic task of the USSR in the field of agricultural production will attract the special attention of the peasant masses in the capitalist world and will exert tremendous influence on them.

In order to solve its basic economic task the USSR must surpass the USA in per capita production of both industrial and agricultural output. It is perfectly clear that in the field of industry the United States of America is the foremost industrial capitalist power in the world. As regards agriculture, some commentary is necessary, for in the field of agriculture the USA is not the foremost country of the capitalist world. The agriculture of the USA is inferior to a number of European capitalist countries as regards its intensity. This can be seen in the lower yields of crops, in the lower productivity of its livestock, and in the lower output per unit of cultivated area. When, then, is competition with the agriculture of the USA considered a primary task of Soviet agriculture? Because although the agriculture of the USA is inferior to that of the foremost European countries as regards its intensity, it occupies first place in the world in mechanization of field-crop cultivation and livestock breeding, and in such an important factor as productivity of agricultural labor. Furthermore, for its scope, the multiplicity of the crops it grows, and the diversity of its livestock breeding, for the variety of its soil, climatic and geographical conditions, it is the agriculture of the USA which is most comparable to Soviet agriculture (although the climatic conditions for agriculture and livestock breeding in the USA are considerably more favorable than in the Soviet Union).

(1) Rate of Development of Agriculture in the USSR and the USA

The tasks set by the target figures of the seven-year plan are exceptional in the history of world agriculture both for their scope and the rate of development. Indeed, the fulfillment of the seven-year plan will demand the following rate of development for all the chief branches of Soviet agriculture (see Table I on the following page).

The average annual increase in gross agricultural production should amount to 8.0%. Thus the average annual rate of increase in agricultural production will closely approximate the average annual increase in industrial production, which, according to the seven-year plan, is to amount to 8.6% and will exceed the average annual rate of increase in Department II of industry. Furthermore, individual branches of agriculture are to develop at an even more rapid pace.

Are these rates of development for agriculture and industry as provided for by the seven-year plan real and attainable?

Table I

Increase in Agricultural Output in the USSR During the Period of the Seven-Year Plan
(Output at the end of 1965 in relation to the 1958 level, in per cent)

Gross Agricultural Output	Output of Individual Products										
	Grain	Raw Cotton	Sugar Beet	Seeds of Oil-Bearing Crops	Flax Fiber	Potatoes	Fruit and Berries	Meat	Milk	Wool	Eggs
170	117-129	130-140	140-155	110	131	171	200	200	170-180	170	160
				Average Annual Increase							
7.8	2.4-3.7	3.9-4.9	4.9-6.4	1.4	4.0	8.0	10.4	10.4	7.8-8.7	7.8	6.9

As regards the development of industry, the answer to his question can arouse no doubt whatever, for the entire practice of Soviet planned economy has shown the ability of the USSR to develop industry at such a rapid pace as is beyond the means of the capitalist system.

As for Soviet agriculture, it is a known fact that the rate of development of the grain economy and livestock breeding was quite low before 1953, although even during the prewar period Soviet agriculture showed extremely rapid rates of development, as in the production of cotton and a number of other industrial crops, in which it achieved some outstanding results.

For instance, the cotton crop in 1938 exceeded the average annual level of 1909-1913 by 3.9 times, whereas in the USA the crop increased only 1.5 times during the same period. In this connection it should be noted that in 1937 the yield of cotton in the USSR already surpassed the USA level and considerably exceeded the average yield in all capitalist countries in that period. In the period from 1913 to 1957 the cotton crop in the USSR increased sixfold.

From 1909-1913 to 1938 the sugar beet crop increased 4.7 times, the crop of flax fiber — 2.1 times, and potatoes — 1.9 times. The gross crop of tea leaves increased 6.5 times during the same period. Furthermore, the cultivation of a very wide selection of industrial crops was mastered, crops such as formerly had not been grown at all in Russia, or hardly at all.

However, the great successes in the development of individual branches of agriculture before the war could not compensate for the fact that the grain economy, which is the foundation of foundations of the entire agriculture of the country, simply marked time for a long period. When we consider the growth in the population of the country and the increased need for grain as a result of the rapid industrialization of the Soviet Union, we might say that it was not merely a case of marking time, but even of lagging behind. This applies in even greater degree to the state of livestock breeding. For a very long period, up to 1953, livestock breeding lagged greatly.

The tremendous significance of the diverse system of measures which the Party has been consistently carrying out on the initiative of the CC CPSU beginning with the year 1953 is characterized by the fact that socialist agriculture as a whole, including the grain economy and livestock breeding, for the first time showed the high rate of development, which, theretofore, had been peculiar to industry and other branches of the socialist national economy.

It is the development of agriculture in the USSR following 1953 that is the best and most convincing answer to the question concerning the degree of reality of the rates of increase outlined for the current seven-year period (see Table II on the following page).

The figures for the increase in gross production and the production of some of the most important branches are concrete evidence of the fact that the rate of development of Soviet agriculture during the current seven-year period is based not only on the desire and firm will of the Soviet people to solve this task (although this, in itself, is one of the decisive factors), and not only on the increase in the material and technical base, but also on the great advance in socialist agriculture which has already been achieved.

In competition with the USA Soviet agriculture must pass through two stages: it must first reach the American level for absolute production of the most important products and for gross production, and then must overtake and surpass the USA for per capita production of agricultural products.

In the final analysis, both of these tasks will be solved by the relative rates of development of agriculture in the USSR and the USA. What does a comparison of these rates of development show? (See Table III on the following page.)

The comparison of the rates of development given here convincingly shows that, firstly, the agriculture of the USSR is developing more rapidly than the agriculture of the USA, and, secondly, the rate of development of agriculture in the USSR has increased very greatly, whereas in the USA it has dropped.

Even if we consider the development of agriculture in the USA for a longer period, such as 1910-1957, including the years of World War II, we do not find anything like the rate of increase in gross production of agriculture in the USSR for 23 years (excluding the years of the war). This is especially true of the rates of development in recent years, achieved as a result of the numerous measures taken by the CPSU after 1953, and, it goes without saying, the even higher rates of development provided for in the seven-year plan. The average annual increase in agricultural production in the USA for the period 1910-1957 amounted to 1.4%. Even in the period 1941-1950, that is, the years of the war and those immediately following it, the average annual increase was less than 2%. Furthermore, not a single one of the chief branches of agricultural production in the USA in the past half a century showed such an increase as is projected by the seven-year plan or as was already attained in recent years. (See Table IV on the following page.)

Only the average annual increase in the production of oil-bearing crops approximates the present rate of development of agriculture in the USSR. For the overwhelming

Table II

Increase in Agricultural Production in the USSR in 1953-1958
(1958 in per cent of 1953)

Gross Agricultural Output	Output of Individual Products										
	Grain	Raw Cotton	Sugar Beet	Seeds of Oil-Bearing Crops		Flax Fiber	Potatoes	Meat and Fat	Milk	Wool	Eggs
				Total	Sunflower Seeds						
133.3*	169	124**	258***	145**	172	190****	114****	135	158	137	146
	Average Annual Increase										
5.9	11.1	4.4	20.9	7.7	11.4	17.4	3.3	6.2	9.6	6.4	7.9

* Average annual value of gross agricultural output for 1954-1958 as compared with the average annual value of gross agricultural output for 1949-1953, in comparable prices.
** Average annual crop for 1954-1958 as compared with the average annual crop for 1949-1953.
*** 1958 crop as compared with the average annual crop for 1949-1953.
**** Average annual crop for 1954-1957 as compared with average annual crop for 1950-1953.

majority of branches of agriculture in the USA the average annual increase has dropped considerably in recent years.

If we bear in mind the crisis of overproduction in USA agriculture, which is still continuing (and as yet there are no indications that the agrarian crisis is weakening or abating), then the gap between the rate of development of Soviet agriculture and the agriculture of the USA noted above will be maintained in the near future and, possibly, will even increase.

Table IIII

Average Annual Rates of Increase in Gross Agricultural Production in the USSR and the USA (in per cent)

	USSR	USA
For 23 years, 11 prewar and 12 postwar years, excluding the years of the Great Patriotic War, that is, an average for 1930-1940 and 1946-1957	4.3	1.2
Average for the four-year period:		
1950-1953	1.6	1.7
1954-1957	7.1	1.1

However, despite the decisive significance of the rate of growth for the outcome of the competition and the time involved, we must not forget that these percentage increases may refer to quite different volumes. K. T. Mazurov was absolutely right when, in his report on the 40th anniversary of the Byelorussian SSR, evaluating the high rate of growth achieved by agriculture in the BSSR, he stressed the fact that: "Our achievements are manifest and the rates of development are significant. But we fully realize that we have taken only the first steps. We must bear in mind that the level of agriculture from which we began our upsurge was very low, and it is therefore understandable that although the rates of growth are good, we can in no wise be satisfied with the level of agricultural production that we have attained." Although the level of agricultural production in the Ukraine, the Northern Caucasus, and in certain other important agricultural areas is higher than in Byelorussia, the considerations quoted apply, to a considerable extent, to the agriculture of the entire country.

Table IV

Average Annual Rates of Increase in USA Agricultural Production as a Whole and in Individual Branches for the Period 1910-1957 (1) (in per cent)

Agricultural output	1.4
Animal produce	1.5
Of which:	
Livestock breeding for meat	1.3
Dairy livestock breeding	1.4
Poultry raising	2.3
Output of plant-growing	0.9
Of which:	
Fodder grain	0.7
Hay and forage	1.0
Food grain	0.9
Vegetables	1.1
Fruit and nuts	1.6
Sugar-bearing crops	0.9
Cotton	−0.14
Tobacco	0.9
Oil-bearing crops	6.1

While making a comparison of the rates of development, it is also of great importance to compare the absolute levels of agricultural production in the USSR and the USA. Here are some data on the production of a number of the most important agricultural products in the USSR and the USA (see Table V on the following page). (2)

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Table V

Production of Several Types of Agricultural Produce in the USSR and the USA

	Unit of Measure	USSR			USA
		1953	1958	1965	1958
Gross grain crop	mill. tons	82.5	139.5	164.0-180.3	179.8*
Of which:					
Wheat	"	...	75.4	...	39.8
Raw cotton	"	3.5	4.4	5.7-6.1	approx. 7.0
Meat and fat (in slaughter wgt.)	"	5.8	7.9	16.0	16.4
Milk	"	36.5	57.8	100.0-105.0	56.8
Butter	thous. tons	497.0	770.0	1,150	687.0
Wool	"	235.0	321.0	548.0	134.0
Eggs	billions	16.1	23.5	37.0	64.0

* Wheat, corn, barley and grain sorghum crops in 1958. The 1958 grain crop greatly exceeded the usual volumes. In 1957 158.2 million tons were harvested; of this amount 25.9 million tons were wheat.

The USSR has already overtaken or surpassed the USA in ıe production of a number of the most important products. 'or instance, in 1958 the USSR harvested almost twice as ıuch wheat — the chief grain food — as the USA. If we ear in mind that the 1958 wheat harvest in the USA was un- sually high, and if we compare the Soviet wheat crop with he average annual USA crop for the period 1953-1957 (27.4 hillion tons), then the Soviet crop was almost three times s great. In 1957 Soviet agriculture had already surpassed he USA in the amount of butter produced in the country, nd in 1958 in the amount of milk. The USSR produces nore than twice the amount of wool produced in the USA, al- hough when comparing the production of wool, as of sugar eet, it should be pointed out that the USA's own production f these types of agricultural produces is not of decisive ignificance in the consumption of woollen articles and ugar, for a great part of the sugar used is, firstly, im- orted, and, secondly, is produced not of sugar beet but of ugar cane. A great part of the wool consumed is also im- orted.

In spite of the very palpable and rapid increase in grain roduction in the USSR, it still lags considerably behind the JSA as regards gross harvest of grain crops.

However, in 1965 the USSR, if it harvests 10 billion poods 164 million tons), will closely approximate the present ecord level of the USA, and if it obtains a crop of 11 bil- ion poods (180.3 million tons), it will considerably surpass his USA level.

In 1965 the USSR will also come close to the present USA evel in the production of such a decisive agricultural food as meat. If we consider the production not only of cotton ut also of flax fiber, the USSR will in 1965 almost overtake he USA in this as well.

The rates of development of agriculture which have al- ready been achieved and those which are planned for the seven-year period will, as we see, ensure for the USSR in 1965 a level of production equal to that of the USA's pres- ent level of agricultural production taken as a whole, and as regards a number of branches the USSR will considerably outstrip the USA, by almost twofold in the production of milk, and 1.7 times in the production of butter.

The increase in the grain economy will create a firm basis for the development of livestock breeding, as provided for by the plan. The grain economy will be able to supply Soviet livestock breeding with 85-90 million tons of concentrated food, that is, about the same quantity as the USA livestock receives.

How will the changes in the level of agricultural production in the USSR, considered above, affect the solution of the chief economic task? (See Table VI on the following page.)

From these data it is evident that the American level of per capita production of milk and butter will be surpassed by the USSR at the very beginning of the seven-year period. The level of production of meat, 16 million tons, planned for 1965, will make it possible to attain three-fourths of the American per capita production. However, the solution of this task can be within five years if the livestock is provided with fodder before the scheduled dates. That is why socialist competition for the solution of the meat problem is primarily, and to a decisive degree, a struggle for the creation of an abundance of high-grade fodder. With the exertion of all efforts, by resolutely increasing the production of fodders rich in protein, as alfalfa, clover, lupine, and others, and with truly efficient care of the pastures, etc., this problem, which also means the problem of attaining the American level for meat production, can be solved within the limits of the current seven-year plan. This is also supported by statements made by collective farmers of Krasnodar Territory, Ryazan Region, and a number of other areas of the country.

It should be most emphatically stressed that the increase in production of fodders with a high protein content is of decisive significance not only in raising livestock productivity but also in achieving a great saving in the fodder itself, and, consequently, an increase in the number of head of livestock.

It is a known fact that feeding the animals with rations

Table VI

USSR and USA Per Capita Production of Several Types of Agricultural Products

	Unit of Measure	USSR		USA	Output required to overtake USA per capita output in 1957	The 7-year plan figure for level of production at end of 1965
		1958	1965	1957*		
Grain	kg.	667	Approx. 801	924	Approx. 208 million tons	180 million tons
Of which: Wheat	"	361		151	In 1958 USSR already surpassed the USA by 2.4 times	
Raw cotton	"	21	" 27	Approx. 41	Approx. 9 million tons	6.1 million tons
Meat and fat (in slaughter weight)	"	38	" 71	97	Approx. 22 million tons	16 million tons
Milk	"	277	" 467	335	Approx. 75 million tons	105 million tons
Butter	"	3.7	" 5.1	4	Approx. 900 thous. tons	1,150,000 tons
Wool	"	1.5	" 2.4	0.8	In 1958 the USSR surpassed the USA almost twofold	
Eggs	Number	112	" 164	378	Approx. 85 billion	37,000 million

* The year 1957 was taken for purposes of comparison inasmuch as the grain crop in 1958 was a record one, and the 1957 crop approximated the average. The 1957 figures for meat and milk are slightly lower than the 1958 figures. Per capita production in 1958 was as follows: grain — 1,050 kg., of which amount 232 kg. was wheat (considerably less than in the USSR for that year); meat and fat (in slaughter weight) — 94 kg., and milk — 326 kg.

that are low in protein content results in a 30-35% overexpenditure of fodders. USA livestock breeders have mastered this truth superbly. The members of the Soviet agricultural delegation which visited the USA recently received convincing proof of this everywhere. Any farmer considered the question of fodder as being a question of the protein content in it. When the members of the delegation visited the agricultural college of the University of Missouri they discovered that by adding protein to the fodder, as well as vitamin B_{12}, antibiotics and amino acids, it was possible to reduce the expenditure of fodder for one pound of pork from 6 to 3.5-4 pounds, for one pound of broiler meat — from 5.5 pounds in 1940 to 2 pounds in 1957.

The competition for the creation of an abundance of all kinds of animal produce in the country calls for a daily, all-round struggle for more effective use of fodder. This, in turn, requires great attention to the problem of proteins, vitamins and antibiotics and to satisfying the needs of the livestock with them.

But without doubt the foundation for the solution of all the chief problems in the competition between the USSR and the USA in agriculture is the Soviet grain economy, the per capita production of grain. The USSR has already outstripped the USA more than twofold in per capita production of wheat. As regards grain as a whole, the USSR, after fulfilling the seven-year plan, will come very close to the American 1957 level for per capita production, but will still lag considerably behind the 1958 level, when the per capita production of grain crops in the USA amounted to over a ton. Which level would it be more correct to use as a basis, that of 1957 or 1958?

The USA grain economy is experiencing a profound crisis and there are no real grounds for expecting any considerable increase in the gross grain harvests in the next few years, and consequently, in the production of grain per head of population. In the period from 1954 to 1957 the wheat harvests did not increase to any considerable extent and were much lower than in 1953. The same is true of the harvests of corn, which is the chief grain crop in the USA and constitutes more than half of the entire grain harvest in the country. During the entire period 1953-1957 the increase amounted to 6.6%. The considerable increase in the gross crops of barley and grain sorghum cannot alter the general picture of the extremely slow development of grain production. Another circumstance which must be borne in mind is that the per capita production of grain crops in 1957 was also noticeably above the average annual level for the five-year period 1953-1957, which was equal to 883 kg.

On the basis of the foregoing, it is likely that in 1965 the per capita production of grain in the USA will be slightly over 900 kg., but more likely even less.

Thus the USSR should overtake the USA in per capita production of grain in the years immediately following the fulfillment of the seven-year plan.

At the same time in 1965 the Soviet Union will still lag considerably behind the USA in a number of branches of agriculture (fruit-growing, for instance) and some very

portant food items (eggs). This task will be solved in bsequent years.

(2) Economic Competition and the Mechanization of Agriculture

One of the most important conditions for the victory of e USSR over the USA in the sphere of agricultural production is the mechanization of agriculture and, primarily, the provision of agriculture with tractors and with all the respective tractor technique, as well as with grain harvester combines (in view of the tremendous role of grain crops in the agriculture of the USSR and the USA).

The following data show how USSR and USA agriculture are provided with tractors: (3)
***

Table VII

Year	Country	Tractors (in thousands)	Harvesting area per tractor (in hectares)***	Number of USA tractors to each USSR tractor
1915	USA	25	5,440	
1920	USA	246	585	
1928	USSR	27	4,185	
	USA	782	184	29.0
1930	USSR	72	1,766	
	USA	920	160	12.7
1940	USSR	531	283	
	USA	1,545	88	2.9
1945	USSR*	381	299	
	USA	2,354	60	6.2
1950	USSR	595	246	
	USA	3,394	40	5.7
1953	USSR	744	211	
	USA	4,100	34	5.5
1955	USSR	844	220	
	USA	4,345	31	5.1
1958	USSR	1,000**	194	
	USA	4,685	28****	4.7

* Recalculated from conditional to physical tractors according to the actual coefficient for 1940.
** On July 1, 1958. Recalculated from conditional tractors to physical according to actual coefficient for 1955.
*** For the USSR — the sown area. For the USA — the harvested area, which overestimates the figure for the USA as compared with the USSR.
**** Harvested area for 1957.

From the figures given above we can see how during the eriod from 1928 to 1940 the Soviet Union confidently and uickly gained on the USA in the number of tractors in agriulture. Whereas in 1928 the USA had almost 30 times as nany tractors as the USSR, in 1940 it had only 2.9 times s many. However, during the war the tractor stock of oviet agriculture was reduced to almost a third of what it ad been, and it was only in 1950 that it exceeded the prear level. In the USA, on the contrary, the number of tracors increased 1.5 times during the period of the war and y 1950 had more than doubled the prewar figure.

If we disregard the ten years of war and the postwar estoration of the economy, the USSR required twenty years o increase its tractor stock from 27,000 to 1 million. The griculture of the USA had 1,048,000 tractors in 1935, that s, their number had increased to 1 million also in a period f twenty years.

However, comparisons that refer to the past do not as yet decide the question of the present and future pace of competition in this field. What is the outlook for competition in the tractor stock, which is, without doubt, the chief index of the technical equipment of modern agriculture?

The USA today has 4,685,000 tractors for use in agriculture, not counting those for truck gardens and orchards, of which there were 390,000 in 1958. The first question that arises is: should the USSR endeavor to equip its agriculture with tractors to the same extent that the agriculture of the USA is supplied with them (about one tractor for 30 hectares of cultivated soil) or the agriculture of England and the Federal Republic of Germany (about one tractor for 15 hectares of cultivated soil)?

In order to equip Soviet agriculture to the same extent as USA agriculture today, about 6-7 million tractors would be required for the present sown area of the USSR, which

would call for a tremendous expansion of the tractor industry and huge expenditures.

However, Soviet agriculture does not need such a large tractor stock even if all the agrotechnical demands are fully and most strictly considered.

The fact that the agriculture of the USA is so heavily equipped with tractors (and the Federal Republic of Germany and England even more so) is due not so much to the agrotechnical requirements as to the socio-economic structure of their agriculture, which is developing under capitalist conditions.

We shall explain this with an illustration taken from the USA. In 1954 there was an average of one tractor for every 44 hectares of cultivated soil (4) on the farms of the USA, and one grain harvesting combine for every 55 hectares of the area sown to grain crops. However, there are very sharp contrasts contained in these average figures. The area served by one tractor and one grain harvesting combine on USA farms, according to data of the 1954 agricultural census, is as follows:

Table VIII

Groups of farms according to value of products sold during the year (in dollars)	Area of cultivated soil per tractor (in hectares)	Area of all grain crops per grain harvesting combine (in hectares)
25,000 and over	62	107
10,000-24,999	47	166
5,000- 9,999	40	50
2,500- 4,999	36	47
1,200- 2,499	32	43
250- 1,199	37	43
Non-commercial farms	21	23-34
Average for all USA farms	44	55

Thus, farms which sold $25,000 and more worth of products during the year had 1.5 times as much cultivated soil per tractor as the average for all agriculture in the USA and they had three times as much soil per tractor as the small farms had. This is a very important circumstance. One of the economic regularities arising from the advantages of large-scale farming is the better quality and the more effective use of the means of production and, consequently, their lesser quantity per unit of area or per unit of output. Bourgeois economists who extolled the advantages of small-scale production in agriculture tried to present as an advantage of such production the relatively large quantity of the means of production per unit of area and per unit of output. V. I. Lenin, in a number of his works, gave a very convincing analysis of this question and showed, in particular, through examples of the use of working and productive cattle, that relatively smaller, that is, more economical, expenditures of the means of production are characteristic of large-scale agricultural production.

It is quite natural that at a large farm every tractor is used on a large area, that is, more efficiently, although the large farm may have a total of many more tractors than a small farm.

This law retains all its force even when these machines are used in socialist agriculture. Soviet collective farms, let alone state farms, are enterprises that are immeasurably larger than the farms in the USA. In 1954 the USA had an average of 97 hectares of soil per farm. There were only 130,000 farms with an area of 400 hectares or more, or 2.7% of the entire number of farms. Each of these largest farms had an average of 1,600 hectares of land.

In the USSR, on the other hand, every collective farm had an average of about 5,000 hectares of land in 1957, and this included 1,700 hectares of sown area. As can be seen, the average sown area of a single collective farm, taken by itself, is greater than the average entire area of each of the largest 130,000 farms in the USA. To complete the picture we might add that the average sown area of a state farm in 1957 amounted to 9,130 hectares.

Soviet, highly concentrated, planned socialist agricultural production has no need whatever of one tractor for every 30 hectares of harvesting area, as is the average case on USA farms, nor even one tractor for every 50-60 hectares, as is the case on large USA farms. To attain and even surpass the degree of mechanization of agricultural work (based on the use of the tractor) that prevails in the USA, Soviet agriculture will require not 6-7 million tractors, but about 2-2.5 times less.

These conclusions drawn from an analysis of the data on the use of tractors on USA farms coincide with the approximate calculations of Soviet agriculture's need of tractors which were made by the Council on the Study of Productive Forces of the Academy of Sciences of the USSR. According to these calculations Soviet agriculture will need about 2,500,000 tractors (in physical units) (5) for all-round mechanization, the increase in the sown area being taken into consideration.

As we know from the theses of N. S. Khrushchev's report at the 21st Congress of the CPSU, Soviet agriculture will receive more than one million tractors in the current seven-year period. It therefore follows that, even if provision for amortization is made, Soviet agriculture will, seemingly, have somewhat more than 2 million tractors in 1966. Thus there will be a little more than 100 hectares of sown area (even taking the increase in the latter into consideration) per tractor. And only a very short period of time will be needed after 1965 in order fully to satisfy the needs of Soviet agriculture in tractors for all-round, complex mechanization of agriculture.

In calculating Soviet agriculture's need for tractors it would be absolutely incorrect to overlook the tremendous reserves latent in the better use of the existing tractor stock on the one hand, and in improving the tractors themselves, on the other hand. The first of these factors depends on the rise in the skill of the agricultural machine operators themselves, and also on the ability of the

ganizers of agricultural production to make most effi-ent use of the tractors. An illustration of the tremendous portunities available in this direction are the tens of ousands of tractor teams which are following the example d method of the outstanding Soviet tractor drivers, Manu-vsky, Gitalov and Tiupko. The second factor depends on viet science and the designing work of the tractor and ricultural machine-building enterprises. They have such serves as transferring to tractors with mounted imple-ents, having the tractors operate at higher working speeds, c.

The genuine technical revolution in the organization of actor work, in the effectiveness of the use of the tractors d in the productivity of labor in agriculture is the result a brilliant scientific idea proposed by tractor driver I. Loginov for automating the work of the tractor when oughing, and its experimental realization. Even more markable results follow from a scientific experiment nducted by engineers of a Krasnoyarsk group of inventors, Mikhailov, B. Suprunenko, I. Kuznetsov, V. Novikov, V. nkevich, S. Chistanov, V. Suprun, electrician G. Rama-nov, and mechanic I. Dorovskikh. They developed Logi-v's scientific discovery and using this as their basis, eated and tested experimentally a system for controlling actors by radio from a single desk. This group worked t such schemes forradio control of tractors as will en-le one person simultaneously to control the work of 18 actors working on an area with a radius of three kilo-eters for ploughing, harrowing, cultivating and sowing. (6) Following Soviet press statements about Loginov's trac-r, items appeared in the USA (7) and England (8) the past inter and spring about attempts at automatic control of actors.

In England the past spring the department of mechaniza-on at Reading University, jointly with the British Scientific esearch Association of the Electrical Industry, demon-trated the work of an automatically controlled, driverless actor at an experimental center in Conning. The tractor ode out of the yard, crossed a highway, heeding the light gnals, rode through the gateway, and distributed fertilizer n the experimental field or dropped pressed hay at the indicated places. This experiment was immediately noted in the USA press. (9)

In the USA tests were made of an experimental ploughing tractor with an automatic control device for moving the machine along a row when cultivating, without interference on the part of a driver. This device consists of two metal gauges installed in front of the tractor and located on both sides of the row. This system makes it possible to automate the work of a tractor with a press-pickup, and, by removing one of the gauges, it can also work with a plough, reaper, ensilage combine, and trailer grain harvester combine.

These simultaneous attempts to automate the chief agricultural work, that is, what might seem a sphere of production most difficult for automation, indicate that the era of automation of agriculture is not far off. Therefore, competition in the field of mechanization of agricultural production will proceed not only in the direction of increasing tractor capacities and in designing improvements in the existing types of tractors and the machines working with them, but will also manifest itself in the intense scientific and experimental development of a system for automated agriculture and the use of the latest means of automation now employed by industry, including controller machines.

Modern mechanized agricultural production is so closely and inseparably connected with industry that the transfer of modern methods of automation from industry to agriculture (not only in livestock breeding but also in work on the land) is natural and inevitable. Furthermore, if we bear in mind the specific features of agricultural work, especially work in the field, and the way various production processes are scattered territorially, automation in agriculture and especially in field work can be of tremendous economic value to a socialist society. In this respect large-scale planned socialist agriculture, which can and should find support in the equally planned aid of science and a powerful industry, has all the advantages.

The outlook for satisfying the needs of agriculture in the USSR for grain harvesting combines is even more favorable.

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Table IX

Grain Harvesting Combine Fleet in the USSR and USA (10)
(in thousands)

Country	Year									
	1910	1920	1928	1930	1940	1945	1950	1953	1955	1958
USSR			2 combines	1.7	182	148	211	318	338	500
USA	1	4	36	61	190	375	714	930	980	1040
How many times US exceeds USSR				35.9	4.4%	2.5	3.4	2.9	2.9	2.1

Beginning to use combines twenty years after the USA, e Soviet Union succeeded in overcoming its lag behind the SA in ten years and in 1940 almost equalled the USA in the mber of combines produced. During the war the Soviet nion at first suffered a setback, and by 1950 the number of mbines produced in the USSR was only a little above the ewar level. During this period the USA had more than ipled its fleet of grain harvesting combines. As a result, 1950 the USA was almost 3.4 times ahead of the Soviet Union. But beginning with the year 1950, despite the tremendous increase in the USA fleet of grain harvesting combines, the Soviet Union kept constantly reducing the gap, and in 1957 the number of grain harvesting combines in the USA was 2.1 times more than in the USSR.

During the current seven-year period Soviet agriculture will get about 400,000 grain harvesting combines and thus will closely approximate the USA in this field. Inasmuch as the number of combines on farms in the USA practically

stopped increasing in recent years, every new year will witness a lessening of the gap between the two countries. It therefore follows that in such an important aspect of mechanization of agriculture as grain harvesting combines the USSR has all the conditions to enable it to come close to the agricultural level of the USA during the current seven-year period and then, in a brief period, to solve this task completely.

It should be pointed out that the solution of the problem of fully providing agriculture with combines and tractors is considerably more difficult for the USSR than for the USA in view of the fact that the sown areas, especially the area sown to grain crops, in the USSR increased in recent years by tens of millions of hectares and will continue to increase in the future, although on a lesser scale. In the USA, on the contrary, the sown areas are constantly being reduced as a result of the agrarian crisis.

The use of tractors and combines will ensure opportunities for solving the chief task of attaining a further advance in Soviet agriculture — raising the yield of all crops and, in particular, attaining, by the end of the seven-year period, a grain crop of 10-11 billion poods (i.e., 164-180 million tons), and for its further considerable growth.

(3) Electrification of Agriculture

Tractors and the machines that go with them constitute one of the most important conditions for a further rapid advance in Soviet agriculture. However, a further rise in livestock breeding and the fulfillment of the task of overtaking and surpassing the USA in this field is most decidedly connected with the electrification of agricultur A tremendous quantitative and qualitative advance in live stock breeding is impossible without all-round mechaniz tion and without the use of an intricate, many-sided syste of machines in all branches of livestock breeding and es- pecially in dairy livestock breeding, poultry raising, and pig breeding.

It should further be said that the problem of mechanizi loading and unloading work in all branches of agriculture can be efficiently solved only on the basis of electrification. Automation also requires electrification, as is well known. The question of electrification and the degree to which electric power is used in agricultural production a in the homes of the workers of state and collective farms is one of the key problems in the competition between the USSR and the USA in the field of agriculture.

A comparison of the scope and rate of increase in the u of electric power in agriculture in the USSR and the USA shows that although the USSR still greatly lags behind the USA as regards the absolute amount of electric power con sumed, it considerably surpasses the USA as regards the rate of development. As a result the gap (in per cent) between the USSR and the USA in the amount of electric power consumed in agriculture has been reduced almost twofold in the past six years. An illustration of the electrification of agriculture and the use of tractors concrete shows how the war retarded the USSR in solving this individual but extremely important task in the competition in agriculture.

Table X

Consumption of Electric Power in Agriculture in the USSR and the USA (11)

Year	USSR		USA		How many times greater is the consumption of electric power in USA agriculture than in USSR
	Consumption of electric power by collective farms, MTS and state farms (in millions of kwh.)	Increase compared with previous date	Consumption of electric power at farms (in millions of kwh.)	Increase compared with previous date	
1926	32		723		22.6 times
1930	49	1.5 times	1,789	2.7 times	36.5 times
1935	257	5.2 times	1,693	-5.4%	7.0 times
1940	425	1.6 times	3,355	2.0 times	7.9 times
1945	375	-11.8%	5,908	1.7 times	15.7 times
1951	1,509	4.0 times	15,978	2.7 times	10.6 times
1957	4,244	2.8 times	23,555	1.4 times	5.5 times

The seven-year plan should introduce considerable changes in this sector of the competition. The planned increase in the consumption of electric power in agriculture will bring the level of consumption by Soviet collective and state farms up to about 25 billion kilowatt hours. American writings assume that consumption of electric power in agriculture in the USA will reach the level of approximately 40-45 billion kilowatt hours. However, even if such is the case, the gap will be reduced from 5.5 to 1.6 times. In view of the material and economic opportunities which the economy of the USSR and, in particular, agriculture, will possess as a result of the seven-year plan, this gap will be surmounted in a very short time.

When solving the tasks of competition in the electrification of agriculture, certain other factors must be taken int consideration, and not only the comparison of the figures for the consumption of electric power.

In the first place it should be pointed out that in the USA agriculture consumes a greater part of the electric power produced in the country than in the USSR. In 1930 Soviet agriculture (the collective farms, MTS and the state farms consumed 0.6% of all the electric power produced in the country; in the USA — 1.4%; in 1951 the respective figures were 1.5% and 3.7%; and in 1957 they were 2.0% and 3.2%. In 1965 the share of agriculture in the USSR will be about 4.6%, which will undoubtedly be higher than the respective

ure in the USA.
Then, too, the system of using electric power in agri-
ture should be most carefully considered. In the opinion
specialists in the electrification of farms in the USA,
y from one-fifth to one-third of all the electric power in
riculture is used for production needs, which, in 1957,
ounted to 5-8 billion kilowatt hours.
In 1957 Soviet collective farms, MTS and state farms used
ut two-thirds of all the consumed electric power for pro-
ction needs, that is, about 3 billion kilowatt hours. In
er words, if USA farms in 1957 consumed 5.5 times as
ch electric power as did the Soviet collective farms, MTS
d state farms, they used only twice as much for actual
ricultural production. However, the agriculture of the
SR greatly lags behind USA agriculture in using electric
wer in a number of production processes which are of
imary importance in livestock breeding.
The 1957 consumption of about 3 billion kilowatt hours
r production purposes corresponds, approximately, to the
49 level of consumption of electric power for the same
eds in the USA. But in the USA, at this level of consump-
n of electric power there were 610,000 farms that prac-
ed mechanical milking of cows, whereas in the USSR in
58 the mechanical milking of cows at collective farms
ounted to only 3.6%.
The situation as regards the mechanical delivery of water
about the same. In the USA, as far back as 1940 43% of
l farms had mechanical delivery of water for livestock
d household needs, and in 1956 two-thirds of all the
rms had mechanized this work. In the USSR, only 27% of
e collective cattle farms used mechanical delivery of
ater.
We shall end this comparison by pointing out that in 1957
actically all farms in the USA were electrified. In the
SSR, all MTS and almost all state farms were electrified
1957. But only 39% of the collective farms were electri-
ed (in the USA 38.3% of the farms were electrified in
942). This difference in the use of electric power is to be
xplained by the fact that during the organization and tech-
cal equipment of Soviet agriculture, which is the largest
the world, the first objects to be electrified were the re-
ir shops of the state farms, the MTS and of the collec-
ve farms, the auxiliary enterprises, and those enterprises
hich processed the agricultural products at the collective
d state farms, etc.
The seven-year plan will create all the necessary condi-
ons to provide electric power to all collective farms in
e country, and for the all-round use of electric power for
rposes of mechanizing the agricultural production proc-
sses.
The fulfillment of the seven-year plan, which provides
r a tremendous advance in the output of agricultural prod-
cts and primarily animal produce, makes the electrifica-
on of agricultural production and the outstripping of the
SA in this field one of the most important tasks in agricul-
ral construction. It goes without saying that it is not pos-
ble to fulfill this task completely in seven years, but dur-
g this period, along with the solution of the immediate,
rgent tasks of electrification, the conditions should be cre-
ed for the complete automation of agricultural enter-
rises, and especially the livestock farms of collective and
ate farms.
It should also be remembered that the electrification of
griculture means not only the electrification of production,
t also the all-round electrification of life in the country-
de. This constitutes one of the most important material
nditions for the eradication of the essential differences
tween city and country in living conditions, habits and
culture.

(4) The Importance of Raising Yields in Accomplishing the Chief Economic Task

The key to the solution of all the tasks of both the grain economy and livestock breeding, which arise in connection with the seven-year plan and, to an even greater extent in the years following the plan, is the increase in the yield of all agricultural crops, and particularly grain crops. (See Table XI on the following page.)

The sharp advance in Soviet agriculture achieved after 1953 was to a considerable extent due to the cultivation of tens of millions of hectares of virgin soil. The brilliant fulfillment of this plan, which was so daring and so gigantic in scope, gave the Soviet people not only grain for food, but also fodder for the livestock. The Soviet people were enabled to maneuver more widely in agricultural production and to distribute the various branches of agriculture more effectively in the various parts of the country. Naturally, the cultivation of virgin soil and the extension of the sown area will continue throughout the seven-year period and also after 1965 in those parts of the country where there is need of this and where there are the conditions for it, but in the main the advance in agriculture will be achieved by an increase in yield.

In this respect Soviet agriculture greatly lags behind both the foremost European capitalist countries and also behind the USA. It also lags behind a number of fraternal countries of the socialist camp. In order to attain an increase in the gross grain crop of 2-3 billion poods, it is necessary to raise the yield by 3-4 centners per hectare over the entire area now grown to grain crops. It this task a realistic one? Is it possible to attain such an increase in the yield in seven years? World agricultural practice says that the task is very difficult and a demanding one, but it can be fulfilled.

The table shows a general considerable increase in yield, and there are a number of instances where the yield increased by 3-4 centners per hectare in a brief period. Such, for instance, was the case in the postwar years in Mexico (an increase of 2.9 centners), Italy (2.8 centners), France (4.4 centners), FGR (3.1 centners), Ireland (4.5 centners). In the postwar period a more or less similar increase was attained in a shorter period than before the war. This is natural, for the use of mineral fertilizers had increased, as well as powerful means of chemically combating weeds and pests in agriculture, and plant diseases.

Many of the fraternal socialist countries achieved brilliant success in a brief period.

Soviet agriculture possesses everything necessary in order to achieve a rise of 3-4 centners per hectare in the yield of grain crops in seven years, it being understood, of course, that all the reserves for this will be used. In 1965 it will receive 31 million tons of mineral fertilizers. This will make it possible to fully satisfy the need for mineral fertilizers for the chief technical crops and for the first time to provide a considerable quantity of them for the grain and fodder crops.

By the end of the seven-year period the increase in the number of head of cattle will make itself felt in ever greater degree, and agriculture will get a considerably greater quantity of manure. If there is a sharp improvement in efficiency in agriculture, strict observance of crop rotation, the complete use of manure and other local fertilizers, the sowing of leguminous plants over large areas, and especially alfalfa, clover, and lupine, along with the use of mineral fertilizers, an increase of 3-4 centners per hectare in the

Table XI

Average Yield of Grain Crops by Countries
In 1909-1913, 1934-1938, 1948-1952, 1953-1957 (in centners per hectare) (12)

Country	1909-1913	1934-1938	1948-1952	1953-1957
Argentina*	9.3	12.4	12.0	13.5
Mexico**	10.0	6.0	7.9	10.8
USA*	13.6	12.2	17.1	18.8
Italy*	12.1	16.4	16.0	18.8
Canada***	14.1	8.1	13.3	14.2
Norway****	16.8	20.6	22.0	23.6
France	12.1***	14.7***	16.4	20.8
Japan****	24.8	30.9	32.1	34.6
Belgium*****	23.7	26.0	29.3	31.8
Great Britain*****	18.7	21.4	24.8	28.0
FGR*******	19.7	20.2	23.4	26.5
Denmark*****	20.0	27.0	32.2	34.4
Ireland****	23.1	24.1	22.9	27.4
Netherlands*****	19.9	25.8	30.0	32.6
New Zealand****	18.0	20.6	25.3	27.1
Sweden*****	16.4	20.3	18.6	20.4

* Grain crops: wheat, rye, oats, barley, rice and corn.
** With the exception of rye, oats and rice for 1909-1913, and oats and corn for 1953-1957.
*** With the exception of rice.
**** With the exception of rye, rice and corn, and for Japan — only rye.
***** With the exception of rice and corn.
****** With the exception of rice and corn for 1909-1913.
******* 1909-1911 before the Versailles limits; 1911-1913 — within the limits established by the Versailles agreement; 1934-1938, 1949-1952, 1953-1957 — within the limits of the FGR.

yield will undoubtedly be ensured. This will create the prerequisites necessary to surpass the USA between 1965 and 1970 in yield and to undertake the solution of a much more intricate task — that of overtaking, in yield, the Western European countries. This will naturally require a longer period and a much larger quantity of mineral fertilizers.

(5) Productivity of Labor in Agriculture in USSR and USA

The task of overtaking and surpassing the foremost capitalist countries in per capita production is, in the final analysis, equivalent to the task of overtaking and surpassing them in labor productivity. This link is not always a direct one. For instance, in the competition between the USSR and the USA Soviet agriculture will, in the seven-year period, overtake and surpass the USA as regards its absolute level and in the per capita production of a number of most important products and crops, in spite of the fact that labor productivity in agriculture in the USA will be considerably ahead of that of the USSR in 1965.

However, such a "one-sided" solution of the task is possible only as the first stage in solving the given problem as a whole. Socialist society cannot help but be interested in the following question: With what expenditures of social labor will the mass of agricultural products exceeding the USA level be created? Today 43% of the Soviet population (1957) is connected with agricultural production, whereas in the USA — 10% of the population (1957).

Under the conditions of a planned socialist economy the rise in the productivity of agricultural labor makes it possible to expand industrial production more quickly and it affords ever more opportunities for a more rapid cut in the working time with a simultaneous rise in earnings. And the rise in labor productivity is also the main source of a rise in the income of the collective farmers and state farm workers.

A rise in labor productivity in agriculture under capitalist conditions leads to a sharp reduction in the number of workers engaged in agriculture, as can be seen most clearly in the USA. For instance, in 1910 there were 13,555,000 people (farmers, working members of their families, and hired workers) engaged in agriculture whereas in 1956 their number was only 7,869,000. At the same time the total expenditures of labor in agriculture as a whole dropped from 22 billion to 13 billion man-hours although the volume of agricultural work increased 1.8 times. This is unquestionable progress resulting from the profound technical revolution in farming in the USA in a number of the leading branches of agriculture. But every year 100,000-150,000 American farmers are ruined and are driven out of agriculture without any hope of finding lasting work in other branches of the economy.

The transfer of a considerable number of agricultural workers to other spheres of activity in the USSR and other socialist countries is necessarily a consequence of the technical progress in agriculture. But under the conditions of socialism, society provides every member with work in some new sector of social labor so that all members of society, including those workers who left agriculture for other

anches of work, enjoy a general constant rise in their ndard of living, an improvement in their working condi-ns, and a cut in the length of the working day, and the sential differences between town and countryside are adicated.

The solution of the problem of labor productivity in agri-lture is, without doubt, the most intricate and most diffi-lt one. High labor productivity in agriculture is an out-nding feature of American agriculture. It is considerably behind those European countries which are most advanced in agriculture both as regards the degree of use of the land and livestock productivity, but it is much ahead of them as regards mechanization of production and labor productivity.

In his report at the December 1958 plenary meeting of the CC CPSU N. S. Khrushchev gave the following figures characterizing agricultural labor productivity in the USSR and the USA.

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Table XII

Data on the Expenditure of Time for the Production of One Centner of Agricultural Produce in the USSR (average for 1956-1957) and in the USA (1956)

	Comparable expenditures of labor for 1 centner of produce (in hours)			How many times greater in the USSR than in the USA	
		in USSR			
	on USA farms	on state farms	on collective farms	on state farms	on collective farms
Grain	1.0	1.8	7.3	1.8	7.3
Potatoes	1.0	4.2	5.1	4.2	5.1
Sugar beet	0.5	2.1	3.1	4.2	6.2
Raw cotton	18.8	29.8	42.8	1.6	2.3
Milk	4.7	9.9	14.7	2.1	3.1
Increase in weight of cattle	7.9	52	112	6.6	14.2
Increase in weight of hogs	6.3	43	103	6.8	16.3

If we compare the present level of labor productivity in griculture with the 1910-1913 level, then we find that labor roductivity in the USA increased about threefold during is period, whereas in the USSR it increased about 3.8 mes. Thus the rate of increase in labor productivity in oviet agriculture was as yet only slightly higher than in the SA. When making this comparison we must note that the itial level in the USSR was incomparably higher than in re-revolutionary Russia.

During the durrent seven-year period labor productivity agriculture in the USSR should increase twofold at col-ctive farms and 55-60% at state farms, and its planned in-rease in industry is set at 45-50% (not taking into consid-ration the reduction in the length of the working day). It erefore follows that in the current seven-year period So-iet agriculture will surpass industry as regards the rate increase in labor productivity.

The planned increase in labor productivity in agriculture, specially at collective farms, will considerably reduce the g of Soviet agriculture behind that of the USA in this here, although we must not overlook the significant rise labor productivity now taking place in USA farming, es-ecially in livestock breeding. The seven-year plan will ontribute something new to the solution of this problem as ompared with the entire period up to 1953 and, to a con-iderable degree, with the period 1953-1958. Until now the se in labor productivity in Soviet agriculture was attained iefly as a result of mechanization, but without a rise in ield and (except in recent years) a rise in the productivity livestock. In the current seven-year period the rise in bor productivity will be the result of both of these factors, at is, ever greater mechanization and automation of production and an ever greater rise in yield, the amount of milk obtained, the wool clip, etc.

Socialist competition has gotten under way in Soviet agriculture for the pre-schedule fulfillment of the seven-year plan. Agricultural workers in all the chief agricultural regions, after calculating all their potentials, have assumed important additional obligations. This affords real opportunities not only for the fulfillment, but also for the overfulfillment of those tremendous tasks directed towards the achievement of a sharp and rapid advance in agriculture, tasks which the Soviet people have set themselves for the current seven-year period. The fulfillment and overfulfillment of the tasks of the seven-year plan constitute one of the conditions for an improvement in the material well-being of the Soviet people and their advance towards communism.

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(21) NEA Journal, February 1959.

(22) The New York Times Magazine, January 25, 1959, p. 64.

(23) Naturally, other conditions being equal, the financial possibilities of states and counties, and hence the possibilities of financing education, differ. In the economically backward states (as is the case in a number of states in the South) they are incomparably worse then in the developed ones, and in rural areas they are worse than in urban.

(24) V. I. Lenin, Collected Works, Russian edition, Vol. 13, p. 312.

(25) Fortune, April 1959, p. 152.

(26) Ibid.

(27) The federal law providing for temporary assistance to education passed in September 1958, which will be dealt with later, has by no means solved the financial problem.

(28) The New York Times Magazine, January 25, 1959, p. 64.

(29) Criticizing the educational system of the United States, Lawrence Hofstad, Vice-President of General Motors, who is in charge of research, said: "All six-year-old children want to know why the earth revolves and what air consists of. But when they get to be sixteen nothing interests them."

(30) Editorial Research Report, May 7, 1958, p. 349.

(31) School Life, October-November 1958, p. 6.

(32) US News and World Report, December 5, 1958, p. 54.

(33) School Life, April 1958, p. 11.

(34) One source of money for needy students is loans granted by colleges from special funds which are to be repaid by students with interest when they have finished college and gone to work. Money for loans comes from industrial and financial corporations which not infrequently make use of the loans to "bind" in advance a particularly gifted student to work for them on graduation.

(35) School Life, October-November 1958, p. 6.

(36) Journal of Engineering Education, April 1958, pp. 609-610.

(37) "A woman intellectual whether school teacher, doctor, lawyer or magazine editor, is, as a rule, an object of gibes and pity in the United States. Underlying this attitude is the old reactionary idea that the place of woman is in the home, where thinking is the least part of her activit See L. Gurko, Crisis of the American Spirit, Moscow, 195 p. 65.

(38) The President's Committee on Education Beyond th High School. Second Report to the President. Summary Report, Washington, July 1957, p. 5.

(39) School Life, September 1958, p. 8.

(40) See "Report of the Committee on the Development c Engineering Faculties" (Journal of Engineering Education May 1958).

(41) Congressional Record, January 8, 1959, p. A 65.

(42) School and Society, February 1, 1958, p. 69.

(43) Congressional Record, September 11, 1958, p. A 80

(44) The President's Committee on Education Beyond th High School. Second Report to the President. Summary R port, Washington, July 1957, p. 6.

(45) School and Society, February 1, 1958, p. 69.

(46) Journal of Engineering Education, June 1958, p. 871

(47) An American government official admitted that som years back practically every outstanding scientist working for the government had been persecuted and insulted, and his honesty and loyalty were suspect. See National Municipal Review, June 1958, p. 267. Since then the situation has improved little.

(48) Li'l Abner is a hero of the American comics.

(49) Congressional Record, September 11, 1958, p. A 80

(50) V. I. Lenin, Collected Works, Russian edition, Vol. 13, p. 329.

(51) Editorial Research Report, May 7, 1958, p. 345.

(52) School and Society, Summer Issue, 1958, p. 277.

(53) The official title of the law is "National Defense Education Act of 1958." It was passed by Congress in the 20's of August and signed by the President September 2, 1958.

(54) The maximum amount of the loan is $1,000 a year.

(55) School Life, October-November 1958, p. 7.

(56) Economic Report of the President, Washington, 1958 p. 60.

(57) School and Society, May 10, 1958, p. 212.

(58) Journal of Engineering Education, May 1958, p. 716.

(59) Scientific Personnel Resources, National Science Foundation, Washington, 1955, p. 71.

(60) School and Society, December 6, 1958, p. 427.

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